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ABSTRACT

The purpose of this handbook is to assist Job Corps Training Center staff in developing an instructional system which relates to present day occupational requirements. This is a how-to-do-it handbook which emphasizes and illustrates curriculum development techniques to assist training and management staff in establishing and updating Career Development programs. Emphasis is placed on firm accountability, vocational counseling, continual trainee assessment of skills development, related education and technical knowledge, and personal development in attitudes and professional ethics. The first four sections contain a general discussion of the methods employed in developing occupational training programs, and how to develop the instructional system to meet the requirements of industry. The last section provides detailed, how-to-do-it guides and curriculum development resources. (Author)

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Occupational Training Program

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Occupational Training Handbook

JCH 400-15.2

CE001 854

U.S. DEPARTMENT OF LABOR
Manpower Administration
Job Corps
1974

OCCUPATIONAL TRAINING HANDBOOK
JCH 400-15.2

This handbook is intended to be used as a supplement to PM 400-15, dated August 1968, and PM 400-15.1, dated January 1970, until such time that the Job Corps national office effects a policy change to obsolete these latter two training manuals.

The various forms and documents shown in this handbook are used as reference material only and are subject to change.

PREFACE

The world of work is changing. Old jobs have disappeared or have been realigned to meet the needs of a more advanced technological society. In the cases where old jobs have been abolished, new ones are emerging. Work opportunities for the unskilled and untrained are disappearing while jobs calling for more occupational training are increasing at a rapid rate. An occupational training program designed to meet the needs of a past era is inadequate for the present time. Changes must be made to adapt our occupational training programs to the changing world. It is the implications, priorities, and potential of this process to which this Occupational Training Handbook is addressed.

The Job Corps Occupational Training Program was developed through the Office of Program Development, under the general guidance of Dr. Bette J. Soldwedel, Associate Director, Office of Program Development, Job Corps. Numerous staff members of Job Corps Centers, regional offices, the national office, and representatives of the Departments of Agriculture and Interior made significant contributions in the development, review, revision, and field testing of the occupational training materials.

Preparation of materials and revisions, as well as Job Corps-wide field testing, were made possible through a cooperative effort of the International Training Consultants, Inc., under the direction of Clifford H. Querolo, Chief, Vocational Training Branch, Office of Program Development. Additional information may be obtained from the Chief of Vocational Training, Office of Program Development, Job Corps, Manpower Administration, U.S. Department of Labor, 601 D Street, NW., Washington, D.C. 20213.

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SECTION I

INTRODUCTION

Purpose of the Handbook

The purpose of this handbook is to assist Training Center Staff in developing an instructional system which relates to present day occupational requirements. This is a how-to-do-it handbook which emphasizes and illustrates curriculum development techniques to assist training and management staff in establishing and updating Career Development Programs. Further emphasis is placed on firm accountability, vocational counseling, continual trainee assessment of skills development, related education and technical knowledges, and personal development in attitudes and professional ethics.

The first four sections (I, II, III, IV), contain a general discussion of the methods employed in developing occupational training programs, and how to develop the instructional system to meet the requirements of industry. This Handbook is designed to give the user the needed background for understanding and appreciating the principles underlying the procedures in developing an instruction system. The last section (V), provides detailed, how-to-do-it guides and curriculum development resources.

General Description of Training

The broad behavioral objectives and performance criteria for each Occupational Training Program should be designed to assure that each Training Center's management staff establish an individualized training system, to assure that each trainee, upon completion of training, will demonstrate the following behavioral characteristics;

+ The minimum, specific occupational skills and knowledges needed for entry-level job positions.

- The minimum, specific job physical profile, social skills and knowledges, as well as attitudes and professional ethics needed to sustain the trainee in the entry-level job.

- The minimum, specific occupational related academic skills and knowledges that directly meet the reading, writing, speaking, listening and arithmetic needs of the trainee during training, on work experience performance, and ultimately on the permanent job.

Quality and meaningful training can only be accomplished through a thorough training analysis, purposeful curriculum development, and proper implementation and evaluation techniques. As much as possible, the total training curriculum must be individualized to ensure each trainee of receiving the highest quality of training attainable. Quality training begins with utilizing the Occupational Training Guides as the foundation of curriculum development. Occupational Training Guides are described in detail in Section V page V-9 of this handbook. Further quality of training is enhanced with the use of the Training Achievement Record. The Training Achievement Record serves as a quality assurance document as well as a complete history of the trainee's progress throughout his or her entire training program. The Training Achievement Record is described in detail in Section IV page IV16 of this handbook. The Training Achievement Record is designed to continually evaluate each trainee's progress. Also it will furnish valid information to all training and management staff to assist in continual refinement and updating of training and curriculum to meet the demands of the present day labor market.

Overview of System Phases

The systematic procedures for developing an instructional system as described in this Handbook are grouped in phases or generic groupings of activities. The phases are designed to assist any Training Center Staff in establishing and delegating responsibilities and in formulating sound instructional management techniques. These phases have been identified as: Analysis...Development ...Implementation and Evaluation.

Each phase has a peculiar set of activities and objectives, but the key factor is that all phases link together to form a total training program designed for the present day job market. This unification and systematic approach to occupational training places a high degree of effort on individualizing curriculum and training. These phases should not be considered as separate or total entities, but rather as a network of activities that lead to the final development of a sound Career Development Program. Nothing should be left to chance. The catalyst that binds these phases together is a total commitment of the training staff to the training program.

The Analysis Phase

The object of this segment is to offer guidelines to assist in basing a decision as to whether it is feasible to offer a training program for a specific occupation.

This phase demonstrates how to determine where the program should be taught.... if the minimum can be accomplished....if all the required equipment and training aids are on hand or available prior to implementation....if a sufficient staff, thoroughly trained is available. It is vitally important to determine whether additional training of staff is necessary prior to implementation of any given occupational training program. (its's too late when trainees have already entered a training program.)

Development Phase

The object of this segment is to assist in producing curriculum that is self-teaching for a percentage of the trainee population, self-paced for some and individualized for all. Firm training objectives should be prepared for the total instructional course. Trainee terminal behavior tasks and activities should be designed and developed to allow the same training opportunities for all trainees, whether the training is conducted on or off a Training Center. All instructional media and resources, material, and equipment should be obtained and a training strategy developed, staff training completed, and definite plans designed for implementation.

Implementation Phase

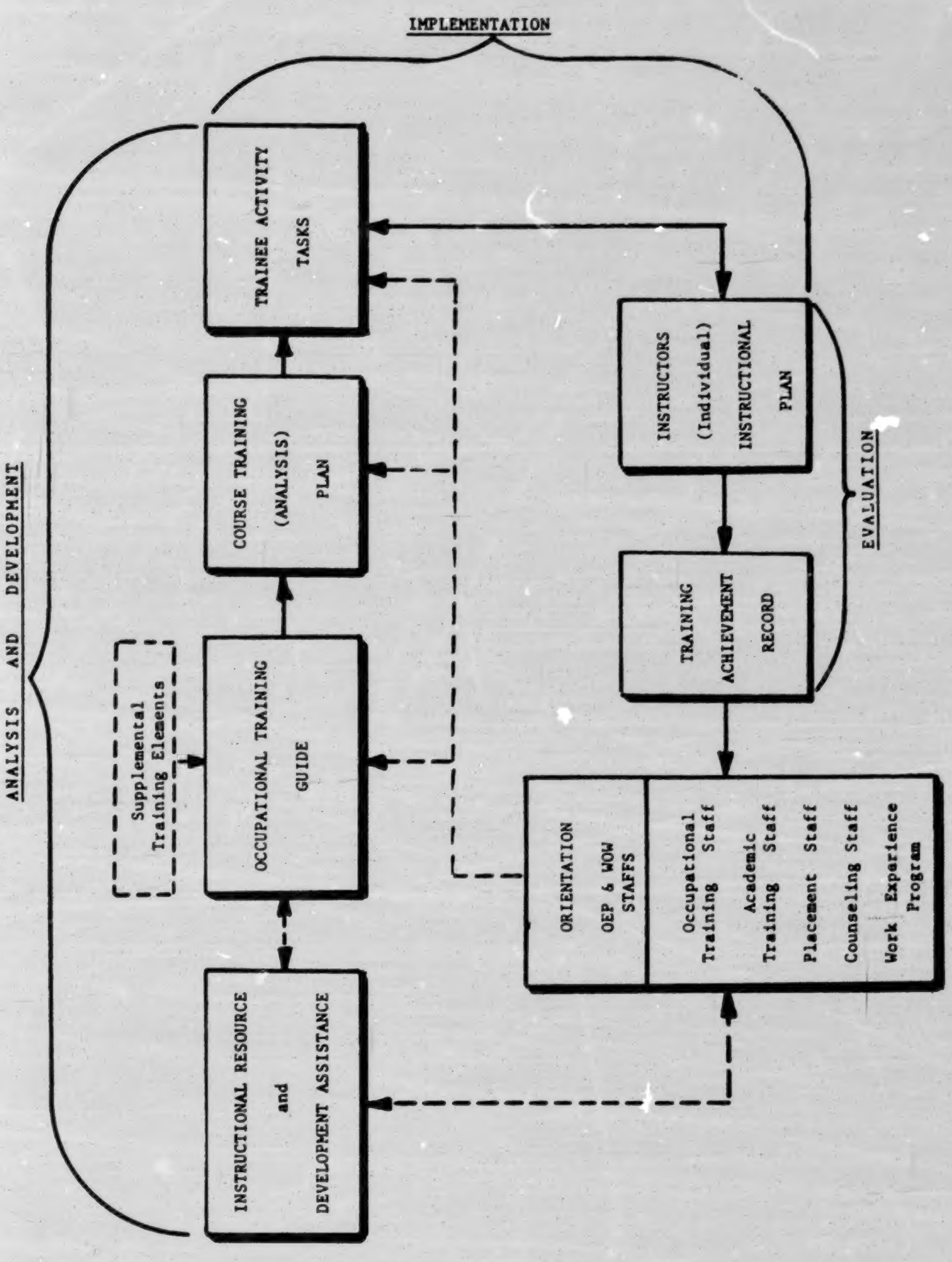
The object of this segment is to assist in the actual implmentation....the carrying out and the follow through with the activities, decisions and production of the previous phases. Implementation is teaching the course, rating the trainees on their performance, and maintaining a training atmosphere conducive to learning. Well-trained staff, with full support of Training Center

Management, is the key to full implementation of the Development Phase. Thus, implementation is not only a primary goal of a training system, but is also the beginning of an effort to measure the effectiveness of every part of occupational training and instructional management.

Evaluation Phase

The object of this segment is to assist Training Center Staff in the proper techniques in counseling each trainee on a continual basis as to his performance and progress. This is the portion of training which all trainees need in order to identify what their accomplishments have been as related to the total training program. This phase demonstrates how to determine whether the curriculum and training has been effective in terms of trainee performance on each training element of the Occupational Training Guide. It will provide data to support and direct change throughout the entire Training Center. Also, this phase will supply data to identify where additional effort and support are needed. Evaluation becomes both the final and the first step in a systematic approach to Occupational Training. As a final step, evaluation identifies which trainees are prepared for work experience and job placement. As a first step, evaluation closes the loop of all phases by furnishing information to all Training Center Staff as to the efficiency and quality of the training given. Evaluation completes the cycle of information flow, documentation, and turns four separate phases into a system which, if monitored, continues to improve the training program and becomes more effective in meeting the goals of realistic Career Development.

The flow chart on the following page, figure A, expresses pictorially the four important phases of Occupational Training. In simplest terms, it shows the ingredients essential to each phase. All the ingredients are vital to the success of building a realistic Career Development Program for those who seek and desire training.


ANALYSIS AND DEVELOPMENT
IMPLEMENTATION
EVALUATION
INSTRUCTIONAL RESOURCE and DEVELOPMENT ASSISTANCE
Supplemental Training Elements
OCCUPATIONAL TRAINING GUIDE
COURSE TRAINING (ANALYSIS) PLAN
TRAINEE ACTIVITY TASKS
INSTRUCTORS (Individual) INSTRUCTIONAL PLAN
TRAINING ACHIEVEMENT RECORD
ORIENTATION
OEP & WOW STAFFS
Occupational Training Staff
Academic Training Staff
Placement Staff
Counseling Staff
Work Experience Program

OCCUPATIONAL TRAINING FLOW CHART

Figure A

SECTION II

WHAT IS LEARNING ?

Introduction

Before any training program can be initiated there must be trainees or learners who express a desire to learn. It would be well at this point to summarize some of the best ideas on learning. There are, first of all, no hard and fast rules for learning. Moreover, depending on the kind of learning involved, there are exceptions to every stated principle, to every condition. However, there are seven general factors that, when correctly taken into account, definitely encourage learning. On the other hand, if any of these seven factors are neglected or incorrectly applied, learning is definitely discouraged. These seven factors are: Motivation, Organization, Participation, Confirmation, Repetition, Application, and Individual Differences.

Motivation

The learner must want or need to learn if there is to be much learning. There has to be incentive if learning is to take place. Within reasonable limits, the more intense the motivation, the greater will be the learning. There is very little accidental learning of any degree of complexity. Several subprinciples fall within this area.

Giving or stating to the trainee the goals to be achieved during the learning session will strengthen motivation. There must be distinct learning goals. To be motivating, the goals must be clear to the learner. Learning is favored by an early definitive statement of the goals for each learning period. The trainee should know each time what he or she is expected to learn; but, more importantly, he should be told exactly what he is to do with the new knowledge or skill. Obviously, the trainee must be persuaded that the goal is desirable and must believe the goal is worth the effort. Accordingly, he must see the goal as obtainable. The learner must think there is a real chance for success. Thus, it is usually best to set a series of fairly easy, short-range goals where the material or task is complex or long-term.

Motivation is enhanced and sustained if the learner is told of his or her progress from time to time. The learner must know if he or she is succeeding or not; he must have knowledge of progress. If the trainee is having trouble, positive suggestion that he can succeed aids motivation. Encouragement aids motivation, whereas negative suggestion hampers motivation. Praise for correct answers or good performance is usually more motivating than reproof for poor performance.

Motivation is favored when the material is presented realistically and when the practicality of the content is clearly demonstrated. Realism and practicality are most effective when the instruction includes showing how the knowledge and skill being learned is used on the job.

Concurrently, the trainee's motivation will be strong if he expects to use the knowledge or skill in the immediate future. Anticipated early use strengthens the desire to learn. If the trainee knows he is going to perform the same steps immediately after they have been demonstrated, he will pay more attention to the demonstration. Or, if he knows he is to be tested on the content immediately following the showing of a film, he will watch the film more closely. Frequent exams and quizzes, if correctly used, can help sustain motivation. The learning situation must be a challenge if it is to be motivating.

Learning conditions have to maintain a fine balance between success and failure-if the task is too easy, the trainee is bored; if the task is to hard, he is frustrated. However, it is usually more motivating if he is pressed to move a little faster and a little farther than he expects or feels that he can go. If the material or task is too easy and the learner is always successful, he may lose interest because of the lack of challenge. There has to be some failure against which to measure success.

Organization

The learner has some tendency to see and organize patterns or relationships in the material of the activities which he is learning. But, unaided, this tendency cannot be trusted to form the desired relationship. This natural organizing process must be directed if effective learning is to take place.

The more meaningful material is to the learner, the better it can be organized and learned. Meaningfulness generally is enhanced by a preliminary overview or introduction to the whole pattern of the material or process to be learned. It is always best to use words familiar to the learner, and to explain all unfamiliar and technical terms as they are used. This is best done by relating new material and new terms to the learner's past experience by familiar illustrations and analogies.

Processes and procedures can be shown more meaningfully if the related equipment or mechanism is realistically simulated. However, the simulation should only be as faithful and detailed as needed to convey the important factors he will encounter. Simulation of procedures and equipment should emphasize only the essentials of the task being learned and not elaborate on unimportant details. Overly exact simulation can detract from learning.

Generally, explanation of why things are done does help establish meaning. Here again, however, too much detail, too early, can be harmful. It is better to give only rather superficial explanations while the procedure is first being learned, and to introduce more detailed reasoning only after the procedure is fairly well established. The same can be said about explanations of how the equipment or mechanism works. Too much detail too early in the learning process is detrimental here also. Generally, it is best to give only the minimum information needed to learn the procedure. Detailed information on how and why should come after the procedure is fairly well established.

Finally, meaning can be strengthened further by reviews or summaries for logical units of material during each period of presentation, and at the end of the presentation. Always tell them what you've told them.

Organization and learning are easier when material is grouped or organized into patterns. There are several kinds of patterning, all closely interrelated, that are useful for organizing material. Objects and ideas can be functionally patterned. For instance, the interconnected parts of an electrical system ---

a battery, a fuse, the wire, a switch, and a bulb --- form a complete functional unit. An example of functionally interrelated ideas would be the branches of the Federal Government --- executive, legislative and judicial. Spatial patterning is sometimes helpful. For instance, grouping of the instruments on a control panel by function, or the interrelation of planets, stars, earth. Temporal patterns are also useful in organizing material. For instance, the sequence of events in a complex procedure such as the disassembly of a carburetor, or the steps involved in solving a certain mathematical problem. Often, the procedure or material being learned falls into a logical pattern because of the combined elements of functional, spatial and temporal organization. Examples are trouble-shooting procedures for isolating a malfunction in a television set, or, solving a word problem in algebra.

Participation

The individual learns only by his own activity -- mental and physical. What he learns are the mental and physical responses he makes and organizes himself. Within certain limits, the more active the mental or physical behavior, the greater the learning. Mental participation is enhanced if straight information is interspersed with questions. Questioning can be effective, even though there is no expectation of the group or individual answering. When questions are used in this manner, they should be followed by a slight pause and then answered for the trainees. Interspersed questions are even more effective if the learner is required to answer not just to himself, buy by actually writing or reciting his response.

Learning a skill or procedure from a demonstration (motion pictures, television, or a live performance) is enhanced when the learner has an opportunity to actually practice each step in the procedure during pauses in the demonstration. The amount of participation and involvement of the learner varies considerably with the kind or practice. The learner can merely visualize the task or idea to himself mentally picturing the steps involved. Or, going a little further, he can imagine the feel of the task as if going through all the motions. A further step in participation would be for him to vocalize the task or idea, to formulate or restate the verbal descriptions of the task or idea, as well as visualizing and imaging each step. Of course, the most effective of all would be to combine all of the above with actual step-by-step practices of the task itself. Step-by-step demonstration films, slide-tape presentations, or demonstration lectures interspersed with the opportunity to practice the actual procedure or task are highly effective. A further extension of this process is participation bv role playing. Having the learner act out an assigned role in a situation can be a fruitful learning experience.

Confirmation

Much of the time in learning there is a selection process, during which the individual tends to acquire and repeat those actions that accomplished one or more of the following:

- Led to success in that situation
- Tended to satisfy the motivating conditions
- Served as a means to desired ends

Unsuccessful or annoying responses tend to be avoided and to shift the learner's activity to other actions that may lead to success.

If there is to be full reinforcement of a response or action, there must be a checking or confirmation of the success in the mind of the learner. He has to know whether the response or the action was right or wrong. Once the right response is at least partially established, and provided the consequences of the wrong response are stressed, demonstration of the wrong response will further establish the right action.

Repetition

Mere repetition of an activity has very little, if any, strengthening effect on learning. Repetition apparently just gives the strengthening or weakening factors more time to affect the learning. Practice is effective only when done under the favorable conditions of proper motivation, meaningful organization, continuous participation, etc. Purposeless or meaningless repetition and practice does not enhance learning.

A degree of over-learning is very important to learning. Retention is favored if, in the initial learning, the material is practiced or repeated beyond the point of its barely being learned. However, repetition or continuation of practice, to the point where serious fatigue or boredom sets in, may have a negative effect on learning. Variations, in the less essential details, tend to off-set the fatigue sometimes associated with learning and repetition. Realistic practice helps to overcome the demonstrating negative effects of repetition. It is usually best to practice an activity in a realistic setting and in the way in which it will be used or needed in the future. Realism is most effective when only the essentials of the situation and the task are reproduced so the learner does not get lost in the non-essential details.

Generally, it is best to develop a task or a procedure, or even an idea, as a whole-part-whole learning sequence. For instance, when teaching the assembly of a carburetor it probably would be best to begin by demonstrating the entire assembly procedure once; then to break it into a step-by-step demonstration; and finally to recombine all the elements in a complete run-through of the assembly procedure. However, the application of the whole-part-whole concept depends upon the degree of integration difficulty, the length of material, and upon the ability of the learner. If a task is too difficult, or too long to be learned efficiently as a unit, it may be desirable to break it into meaningful smaller units first ---- but always emphasizing the relationships to the whole task. In this situation, meaningful sub-goals must be set for each sub-unit. Finally, the entire operation can be practiced as an entity by relating back to each of the sub-units.

Under many conditions, learning is favored when practice periods are spaced over intervals of time, rather than massed together. Concentrated practice of any one activity for periods much longer than 30 minutes without some sort of break is open to serious question. A short break in the routine is usually all that is necessary. The change of activity is what is important, not the length of the break.

The sooner the practice follows the instruction or demonstration, the greater the benefit to learning. Minimum delay of practice is the key to efficient learning. Immediate imitation of movements while viewing would be desirable, if such activity does not distract from the observation of the movements being demonstrated. Thus, intervals during the demonstration should be provided for practice. Step-by-step intermingling of demonstration and practice is usually best for the learning procedures. However, provision must be made for well-integrated review and practice of all the material or procedure, pulling together all the discrete steps and activities that go to make up the complete procedure.

Application

The tendency or ability of the learner to generalize what is learned and to apply or transfer the new knowledge to new problems and situations is helped by inducting a set or attitude towards generalization as part of the instruction. Application and transfer to a new situation cannot be assumed---there must be specific training for transfer. Practice must be in a realistic situation to begin with; but in addition, transfer of the new knowledge or skill to new situations or applications must be demonstrated and practiced by the learner. The learner must be made aware of the possibilities and the problems involved in generalizing from previous knowledge and skills. Generalizing and applying newly learned material is facilitated by the recognized similarity of what has been learned to the actual task situation. Instruction should point out and foster the recognition of such similarities.

Individual Differences

Up to now the discussion has been centered upon conditions for learning that can be manipulated and controlled in the learning situation, but what about those factors which the learner brings to the situation? The individual differences are probably as important as all the other factors combined. A person's ability to learn is greatly affected by his or her:

- General mental ability
- Education level
- Previous knowledge or skill in relation to specific material to be learned.
- Specific aptitudes; for example: mechanical, spatial, verbal, perceptual speed, kinesthetic sensitivity, etc.
- Past experience with various teaching techniques, such as film, television, lectures

These individual differences must be recognized and dealt with because of their considerable effect on all the other factors. To be truly effective, instruction must be responsive to individual differences.

SECTION III

ANALYSIS AND DEVELOPMENT

Introduction

The Analysis and Development phases have a set of peculiar activities and decisions that must be made prior to implementation of a training program. It has been previously stated that phases should not be considered as separate and total entities, but as part of the total approach to quality instructional management. It becomes a difficult task to establish a firm dividing line between the Analysis and Development phases, because consideration must be given to each block identified in the Analysis and Development portion of the Occupational Training Flow Chart during both phases of applying the systems approach to development of training programs.

This section of the Handbook is limited to identifying and discussing resources and the procedures necessary to apply when conducting the Analysis and Development phases of any occupationsl training program. Some of the procedures are exemplified with a portion of a Course Training (Analysis) Plan for the AUTOMOTIVE MECHANIC COURSE, DOT Code 620.884, using (OTG) Occupational Training Guid. 440.81,dated October, 1972 as the statement of essential training elements. Two examples of student tasks are illustrated in Section V which should be used for reference purposes.

Responsibility

Each Training Center has the ultimate responsibility for the success of training programs. The Center must coordinate, supervise, and initiate requests for assistance when the Analysis and Development phases are undertaken. The Centers are responsible for developing the Project Training (Analysis) Plan and Trainee Tasks/Activities, to include the detail and procedures contained in this Handbook.

ANALYSIS AND DEVELOPMENT PROCEDURES

Step One

The first step of the Analysis procedure is to identify the minimum essential skills and knowledges, to outline or determine what the job physical profile is, and to know what professional ethics and attitudes are required for job entry-level trainees in the occupational program under consideration. If an Occupational Training Guide (OTG) has been developed for the training course under consideration, then this document has accomplished the task of identifying the minimum essential skills. If the OTG has not been developed, it is the responsibility of the Training Center to develop the OTG or to acquire assistance in developing the OTG. The Dictionary of Occupational Titles, Volumes I, II and Supplements, Third Edition, is an important resource for OTG development. The DOT volumes contain information developed and prepared by the United States Department of Labor for any person or organization engaged in training, placement and/or occupational counseling. The information presented in these volumes was obtained mostly from employers. Volume I contains over 40,000 updated job titles and codes to consider for any possible training program a Training Center desires to offer. Volume II provides a method of grouping jobs having the same basic occupational, industrial or worker characteristics to help the Center discern relationships among occupations, and as a standard approach to classifying the abilities, occupational experiences and potentials of trainees. These DOT publications should be standard publications used not only for training analysis and development, but for continual reference by counselors, Occupational Exploration, Orientation, World of Work and Vocational Training Staff.

Step Two

The second step is the development of additional training elements peculiar to local needs in the geographical area in which the trainees will be placed in entry or above-level jobs. These elements should be added to the basic OTG, and if an OTG does not exist, they should be included in the preliminary OTG. The responsibility falls with the Center to acquire this information from any source possible. Example sources would be from responsible and knowledgable people and organizations of industry, labor unions, occupational training institutions, employment services, etc. Since the goal of the Training Center is to place its graduates into jobs in locations previously identified, it is essential to determine the training requirements for those locations.

Step Three

The third step is to determine and utilize Center Staff expertise. All Center Staff, working together for one common cause, must be called upon for their knowledge and experience to guarantee that the training they provide will satisfy trainee needs. In the same way that the DOT and other resources serve to develop minimum essential skills and knowledges, the expertise of the Center Staff must serve the same purpose: to develop the Course Training (Analysis) Plan and Trainee Activities/Tasks. If it is determined that the curriculum cannot be developed by Center Staff, then the problem can be solved through staff training or by acquiring resource assistance. The Center is responsible for the complete development of course material.

If all or part of the training is to be given on Center, training staff capabilities and commitment is most essential; however, if training is contracted or acquired from other training institutions, then staff training need not be so extensive as to enable staff to develop curriculum.

Step Four

The fourth step is to determine program logistics. As defined here, this includes determining if adequate classroom and shop space is available;

determining the availability of standard equipment; determining the availability of test and/or special equipment; determining the availability of training materials, training aids and devices, including audio-visual equipment (both hardware and software). These staff decisions are necessary, whether training is offered on or off Center. It is most important for Centers conducting training, and is also important for determining if off-Center training will meet the expected criteria set forth by the Occupational Training Guides (OTG's).

Step Five

The fifth step is that of developing the Course Training (Analysis) Plan. This step is only for those Centers conducting all or part of the training program. At this point it becomes impractical to separate analysis totally from development because this part of the curriculum is necessary for training and management at all levels for total support to the individual trainees and the training program.

The Course Training (Analysis) Plan, Section V, Figure 0 , the result of Analysis Phase of curriculum/training design. The example given represents one unit of instruction in an Automotive Program. The example is not designed to show actual course content or sequence of instruction in a given program. The example does illustrate, however, the minimum detail required in establishing training objectives, trainee tasks and activities, and in identifying the tools-equipment-training aids and training materials to accomplish the represented training elements of the OTC.

Step Five, Procedure 1

The first procedure in developing the Course Training (Analysis) Plan (CTP) is preparing training objectives. As the name implies, objectives are descriptions of training which in turn become the broad evaluation criteria. It cannot be too strongly expressed that objectives should be directed to the individual in a given subject area. The column titled Course/Project Unit of Instruction and Objectives of the CTP lists the training objectives broken out in units of instruction. The objectives in each unit of instruction are in a logical sequence to coincide with Center capabilities. This column in the example shown in figure 0, Section V, Unit 1, Occupational Orientation and Exploration contains two objectives; Unit 2, Basic Skills, Tools, Equipment and Hardware contains one objective; Unit 3, Automotive Electrical System contains four objectives. Objective D of Unit 3 describes the evaluation or quality control of training for the electrical system unit of instruction.

Step Five, Procedure 2

The second procedure in developing the CTP is preparing task/activity descriptions. As can be observed from the examples under the column titled Trainee Activity/Tasks of the CTP, each objective contains one or more tasks or activities. The activities are described in sufficient detail to establish firm guidelines for developing the actual tasks. Examples of tasks 3-A-2 and 3-B-2 are illustrated in Section V. Tasks should be developed for whatever best applies to the individual approach in training, and these are decisions left up to the Training Center.

Step Five, Procedure 3

The third procedure in developing the CTP is preparing a list of all necessary tools, equipment, training aids and materials necessary to accomplish each task or activity. This procedure is also illustrated in the column by the same name in the CTP example.

Step Five, Procedure 4

The fourth procedure in developing the CTP is identifying each training element that the task or activity relates to. There is no simple procedure or mechanical approach to determining the associated related elements for each task. This procedure can be time consuming, but is necessary to make sure that all minimum training requirements are covered.

When the CTP has been completed, it becomes a tool and total profile of the program. It becomes a tool for use by all levels of management and all instructors on the center to support the course of instruction.

Step Six

The sixth step is that of developing the trainee activities and tasks. At this point it becomes important to emphasize that this area is the heart of curriculum development. Up to this point in analysis and development, limited curriculum has been developed to communicate with the trainees on an individual basis. As stated before, tasks and activities can use any approach to communicate with the trainees. Now it becomes time to ask the question, "can the task be developed on Center, does the staff need help in development or have tasks been developed by other training programs on other Centers that will save time and staff efforts?" This is a question that only the Center Staff can answer based on the details of their analysis. A most important point to remember is that the total curriculum must be developed to allow for individualized training. And at the same time to afford all trainees the opportunity to be trained and evaluated on the same curriculum.

TRAINING FEASIBILITY STUDY

Introduction

Is training for a certain job feasible at a Center? Ordinarily, the concept of feasibility is related to the narrow question of capability of the Center to carry on the training. The feasibility study should also consider the desirability of the training. If a Center is to conduct a certain job training program, will it lead to the right kind of a job for the trainee? To answer this question many factors have to be considered, and many other questions have to be asked. Systematic feasibility studies are absolutely necessary to determine whether the training should be offered.

Analysis of Job Prerequisites

The number of jobs available to trained and skilled workers is almost limitless today, but what are the jobs that trainees can hope to qualify for? A key question is: What are the special qualifications required by the job cluster? This question can be further broken down into eight important subareas, each of which adds to the final decision. The job requirement factors to be considered are as follows:

- Vocational Skills
- Educational Level
- Licensing, Certification and Entry Testing
- Union Membership
- Previous Job Experience
- Age
- Physical Ability
- Sex

Can a Center provide enough training to develop the skills demanded by the prospective employer? It is important that the skill levels required for job success are clearly and realistically identified.

The feasibility study should also uncover the current educational demands of the industry. Some industries, in cooperation with unions, have established graduation from high school as an educational requirement. Some even require post-high school educational attainment. Will prospective employers hire trainees with a high school General Educational Development (GED) Certificate? If an industry has taken 15 or 20 years to raise its educational requirements, it will not lower the bars overnight. Just as trainees should be realistic in setting their employment goals, so should Training Centers.

The next area of interest is union membership requirements. A close investigation of union requirements in a particular career field should be made before offering a given training program. Many unions are very eager to broaden their membership. They may be able to provide assistance in many areas of your training and placement efforts.

The age, physical and health requirements of a given job must always be considered. There is definitely a downward trend in the average age of trainees. It is important to determine the age and physical demands of a job before training is started. Many jobs are very demanding physically. Are trainees strong enough or can they handle the physical demands of the proposed job? For economy reasons, thought might be given to developing some training programs that can be used by both men's and women's Centers, but is there any real opportunity for women in the job cluster?

Analysis of Job Attributes

There are many low-level jobs that tend to be low-paying, that have a high rate of turnover, and that offer minimal chances for advancement. These are the types of jobs that young men and women should avoid.

Therefore, the second most important question is: What does this job have to offer the trainee? This question can be broken down into the following consideration:

- Entry Salary or Wage Scale
- Salary After 5 Years
- Advancement Opportunities
- Personal Considerations
- Labor Market, Considerations, including significant Regional Placement (How many jobs available where?)
- Technological Considerations, including where the field will be in 5 or 10 years
- Training Opportunities
- Job Image

Don't train for poverty. Consider not only the starting wage scale, but the expectations after five year's experience. Many jobs have a minimum starting wage , but pay good wages after a few years' experience and further training. Other jobs pay what appear to be acceptable wages from the very start. However, there are dead-end jobs that do not pay more with increased experience. Don't accept or reject a job cluster only on the basis of starting wages. Consider both the beginning wages and the potential wage increases; also remember that there is more to job advancement than just wages. Some trainees will be content with a good-paying job that offers no job progression; some will want the opportunity to advance in skills and responsibilities. Flower arrangers, ward helpers, and ambulance drivers have little chance of increasing their earnings. On the other hand, the construction trades offer generally good money, but few advancement opportunities. Other jobs offer all kinds of future prospects for advancement.

What are the personal considerations for the job? Is extensive travel required? Is the job blue collar or white collar? Is it an outside or inside job? Are there any odd working hours or shift requirements? A close investigation of the actual working conditions will reveal the personal aspects of the job that must be considered in the feasibility study.

Even a cursory look at the labor market will reveal the important facts that need considering before deciding to provide training for a given job. The main consideration is to determine how many jobs are available where. The logging industry operates mainly in the Northwest and Southeast. Automobile mechanics are in demand nationwide. Some jobs have only seasonal requirements, others have regional demands. Others are in demand only in urban or rural areas. The size and scope of the labor market must be known. Where will this career field be five or ten years from now? Is the job on the way out, or is it part of a new and emerging industry? Is it part of the paramedical field that is expanding because of a recent government legislation? Is it part of the communications, plastics or electronics industries? Training should be for the future, not just for the present. Centers can aid not only trainees, but industry as a whole by giving training for jobs in new or expanding fields. Centers should not furnish training for dying industries.

Another consideration that needs investigation in this area is that of advanced training opportunities. How much training should Centers provide to insure that trainees can take advantage of further training from other sources? Should the goal be only the first, entry-level job, or for the higher level, more highly skilled job?

The final consideration is : What do trainees think of this job? This question may be hard to answer in absolute terms, but it must be considered. There are many training programs previously established that have had higher than normal dropout rates. One reason for this has been the lack of appeal of the job. This aspect of desirability must be considered before making a final decision to develop certain training areas. Do trainees really want to be truck drivers, cosmotoligists, cooks, warehousemen, draftsmen, or secretaries? It is possible to survey current trainees to determine their likes and dislikes. The results of such surveys will help determine whether to start on a new training program. The survey should sample an adequate number of trainees and it should be as unbiased as possible. It should not attempt to sell a new or existing program.

Analysis of Training Investment

A Third question that must be answered is: What is it going to take in terms of manpower, facilities and materials to develop and conduct this training? Included here are the following considerations:

1. Statistical Information
    - a. Student flow
    - b. Entry rate
    - c. Training requirements
    - d. Length of course
2. Equipment Requirements
3. Facilities Requirements
4. Instructor Requirements
    - a. Instructors available
    - b. Instructors required
    - c. Instructor training required
5. Cost Analysis
    - a. Start-up costs
    - b. Cost of changing a present course
    - c. Off-site cost comparison

Considerable statistical, financial and manpower data are needed to answer this third question. Without this information, it is possible to set up costly programs that help neither trainees nor the Training Centers. Appliance repair, television repair, typewriter repair, and reproduction and printing are costly programs to develop. Another costly program is heavy equipment repair or operation. Training Centers probably should not conduct these programs unless other considerations make the training highly desirable. Not all training programs are inexpensive, but a limited budget demands cost consciousness.

Other Agencies Training For Similar Occupation

What other agencies are training toward the same job vacancies? Without at least a quick survey of the Departments of Labor--Health, Education and Welfare--plus state and local agencies, Job Corps may end up training men for jobs that two or three other agencies are already training toward. There is nothing wrong with this duplication unless the total effort leads to a surplus of trained men for the same job vacancies. If other agencies are already training toward the same job vacancies, perhaps the Job Corps should take advantage of these other training opportunities. This can be done in several ways. One way is to train off-site at these other training facilities. Another is to buy the training program and install it at one or more Centers. Still another way is to use parts of an existing program and to modify them to meet the needs of the trainees. This has been done to some degree already, but not to the full extent possible. In fact, there has been a tendency to reinvent the wheel by duplicating existing programs that are effective.

TASK ANALYSIS

Introduction

Once the feasibility study has been completed and the decision has been made to develop a certain job training program, the next step in the process is that of system design. During the design phase, all the major decisions concerning training objectives, content, sequence, method, media and evaluation are made and the detailed specifications for the system are drawn up. In addition, the validation device containing the performance criteria against which the system will be evaluated will be developed. The first step in the design process is to conduct a complete task analysis of the job for which the training program is being developed. The analysis is undertaken in two stages: (1) listing and describing all the activities that, taken together, make up the job; and (2) determining and listing the supporting knowledge and skills needed to carry out each of the activities.

Task Description

Task description is the foundation upon which the entire design is built. A thorough and accurate task description is absolutely essential to the entire structure because it provides the substance for the content of training; it suggests the sequencing and form of training, and it serves as a statement of the performance criterion which will be used in evaluating both the training and the trainee. Task description is virtually the fundamental source of training objectives. The degree of detail needed for a task description in systems development is much greater than that normally associated with job classification manuals and training literature. Generally, a task description should be detailed enough to provide step-by-step direction and guidance that an apprentice in training could follow to complete the task successfully. A task description is basically a list of summary statements of the behavioral content of a job broken down into component duties, tasks, activities and actions.

A duty is a major subdivision that has a distinct identity within the overall job. The job of auto mechanics, for instance, includes such duties as engine tune-up, engine overhaul and wheel alignment.

> Duties are in turn composed of several distinct tasks. Cleaning the spark plugs, replacing the points, setting the timing, and adjusting the carburetor are tasks that come under the general duty of engine tune-up. A task is a logical and necessary step in the performance of a duty and is usually a fairly long and complex procedure.
>
> Tasks are in turn made up of a series of activities with a common purpose that occur in close sequence. Removing the old points, installing the new points, and adjusting the dwell are activities that make up the task of replacing the points. An activity is a logical and necessary step in the performance of a task and is usually a relatively short and simple procedure.

Activities are in turn made up of a series of actions or manipulations that fall closely together and have a common purpose. Loosening the lock nut with a wrench, attaching a dwell meter, reading the dial on the dwell meter, and setting the gap are some of the actions under the activity of adjusting the dwell. Actions or manipulations are short, simple operations that are frequently common to many different activities and involve using tools, devices, controls and simple test equipment.

A task description is usually developed in three stages. The duties that fall under the job are first outlined. Next, the tasks that fall under each of the duties are listed. In most cases, the duties and tasks can be determined fairly accurately by consulting training materials, manuals and literature. However, task description at the activities level can only be developed by actual on-the-job observation and interview.

The activity content of each task should be described in the following terms:

* The cues, signals and indications that call for action or reaction

* The control, object or tool to be used or manipulated

* The action or manipulation to be made

* The cues, signals and indications (feedback) that the action taken is, or is not, correct and adequate.

The task description must also identify working conditions and environmental situations which might affect job performance. Any special precautions and possible alternatives must be listed for each task. Also, special tools, test equipment and manuals should be identified. And lately, the task description must identify standards of performance. The critical time and accuracy demands of the tasks must be listed. Performance standards such as these provide the criteria for proficiency measurement.

There are many forms that will serve to organize the collection of the task description, but the samples shown in Figure P and R are recommended for Center use. Although the sample information on the form is realistic, it is not factual and is for illustrative purposes only. Note that all the information needed for a thorough task description can be summarized on this form. Moreover, the format organizes the information in a logical manner that prepares the way for the follow-on task analysis.

There are many possible sources of task description information. Some of the more common are training literature, manuals, course outlines, textbooks, occupational qualifying exams, all of which may serve as good starting points. After compiling a consensus of the training literature, the next step should be to consult subject matter experts from training schools and industry. A review by a subject matter expert can be very helpful. However, the best and final authority is a sampling of the on-the-job worker. Foreman, journeymen and apprentices should be observed and interviewed on the job. Remember, however, that the Training Center is primarily interested in entry-level job requirements. Therefore, most emphasis should be placed on observation and interview of the apprentice or entry-level worker to find out what he actually does on the job--what is actually demanded by the job, not what someone thinks the entry-level worker ought to be able to do. Many training programs for entry-level workers include a great deal of unnecessary material that concerns tasks performed only by the highly skilled journeyman. The apprentice usually forgets such "nice-to-know" information rather rapidly and soon loses his unused advanced skills. Even if he were to retain the skill and knowledge until he actually needed it, he probably would find it outdated by then. Moreover, many of the more advanced skills and knowledges are often best acquired on the job or only after considerable experience at the apprentice level.

Task Description

A task description is a list of job activities used as a basis for developing a task analysis which determines the knowledge and skill requirements of the job. The first step in task analysis is to identify the kinds of performance demanded by the tasks., Each task must be analyzed to determine what kinds of things the trainee must know in order to do it, for this information is the basis for all instructional system design decisions. The selection of appropriate objectives, content, sequence, method, media and criteria depends on the correct identification of the capabilities needed to perform the tasks. It is not always easy to catagorize the activity, but a careful analysis will usually identify the performance needs of the task in question. Figure B on the following pages lists some common action verbs that can generally be associated with specific learned capabilities.

The list is not all-inclusive, nor are the terms always mutually exclusive; however, reference to the list should help in classifying performance.

Action Verbs Related to Specific Kinds of Learning

Specific Responding (producing a single, isolated response)	Motor Chaining (producing a sequence of motions)	Verbal Chaining (producting a sequence of words)	Discriminating (select from two or more stimuli)
associate	activate	cite	choose
give a word for	adjust	copy	compare
grasp	align	enumerate	contrast
hold	close	ltter	couple
identify	copy	list	decide
indicate	(dis)assemble	quote	detect
label	(dis)connect	recite	differentiate
lift	draw	record	discern
locate	duplicate	reiterate	distinguish
loosen	insert	repeat	divide
move	load	reproduce	isolate
name	manipulate	(re)state	judge
pick up	measure	transcribe	pick
place	open	type	recognize
press	operate		select
pull	remove		
push	replace		
recognize	stencil		
repeat	trace		
reply	tune		
respond	turn off - on		
rotate			
say			
set			
slide			
signal			
tighten			
touch			
turn			
twist			

Figure B

Action Verbs Related to Specific Kinds of Learning (continued)

Classification	Rule Using	Problem Solving
allocate	anticipate	accomodate
arrange	calculate	adapt
assign	calibrate	adjust to
characterize	check	analyze
catergorize	compile	compose
catalog	compute	conclude
classify	construct	contrive
collect	convert	correlate
file	coordinate	create
grade	correct	develop
group	deduce	devise
index	define	diagnose
inventory	demonstrate	discover
itemize	determine	design
match	diagram	find a way
mate	equate	invent
order	estimate	realize
rank	examine	reason
rate	expect	resolve
reject	explain	study
screen	figure	synthesize
sort	generalize	think through
specify	illustrate	trouble-shoot
survey	infer	evaluate
tabulate	interpolate	
	interpret	
	monitor	
	organize	
	plan	
	predict	
	prescribe	
	program	
	project	
	schedule	
	translate	
	verify	

Figure B

Actually, a list of agreed-upon action verbs, each assigned to a specific category of performance, should be drawn up ahead of time. Using only agreed-upon verbs during the task description phase will make the later analysis much easier.

There is no clear division between job knowledge requirements and job skill requirements; and in fact, both kinds of information may be developed simultaneously. Any listing of knowledge needed on the job reveals the close relationship between knowledge and skills. Each type of learned capability has a supporting structure of knowledge and skill that is specific to its needs.

Job knowledge is the minimum information about existing stimulus conditions, the desired goals or end results, and the means and methods for reaching the goals needed by the worker to insure success in performing a task. Knowledge requirements fall into three general categories: (1) The knowledge content itself, in the form of a concept, rule or principle; an example of such knowledge would be "A torque wrench is used to tighten critical bolts." (2) Perceiving and identifying when and where the knowledge has to be applied in the work situation. The trainee should, for example, know that tightening the headbolts on an engine is a very critical operation in which over-torquing or under-torquing can seriously damage an engine. (3) The practical application of the knowledge in the particular situation. The trainee should know, first of all, that he ought to use a torque wrench when tightening headbolts, and then he should know how to use the torque wrench.

The following is a listing of categories of knowledge and information that may prove useful for task analysis.

- The nomenclature and location of parts, tools, equipment, etc.
- General information about common tools and test equipment
- The clues, signals and indications to look for
- The interpretation of symbols, signals or cues
- The expected outcomes of actions and decisions
- The steps in standard and emergency procedures
- The precautions to take
- The rules for specific mathematical calculations
- Methods (rules) for preplanning
- Methods (rules) for following strict procedural guides
- Strategies for problem solving, diagnosing and trouble-shooting
- Strategies for improvising and inventing when necessary

The above list may not include all the specific types of knowledge needed, but it does outline the general areas of knowledge that have to be dealt with.

There is a tendency on the part of some training specialists to over-emphasize and over-inflate the knowledge content of training programs. A great deal of "nice-to-know" material included in many courses is not really needed to do the job. In addition, many courses designed to prepare entry-level workers include advanced skills and knowledge that only the journeyman needs. These advanced skills and knowledges, as pointed out earlier in this chapter, are soon lost to the apprentice through disuse. The supporting knowledge structure should include very little information that is not specifically required for task performance. There are times, of course, when some general information is needed for background purposes. However, introductory and background material should be kept to a minimum; and when it is used, the trainees should not be required to learn it in detail. Background material should be treated as such--the trainee should only become familiar with the material and not be held responsible for it.

There is another type of unnecessary information that is often found in training courses. If dials, meters, controls and adjustments are labeled, there is no need to spend much time learning their names and locations. Directions, procedures, emergency information and warnings are often printed right on the equipment; thus, the trainee should not be expected to commit posted information to memory. Likewise, it is enough that the trainee knows he must shut down the engine immediately if the Low Oil Pressure warning light come on--there is no need for him to know the warning light comes on when the pressure drops below 14.7 pounds per square inch. There are other job aids that lower training requirements. If checklists, tables of data, nomograms, manuals, etc. are normally available and used on the job, the trainee should learn how to use these aids--but he should not have to learn how to calculate the data or have to remember the steps in a procedure normally available in some sort of job aid. There is absolutely no justification, for instance, for having him learn to calculate square roots the hard way when square root tables are always available. Close observation of actual on-the-job performance and probing interviews of worker will keep unnecessary and "nice-to-know" material at a minimum.

The task analysis phase of the systems development process is critical. The validity of course design decisions is directly related to the care and accuracy with which the task analysis is done. Training programs must be responsive to the real needs of the job.

PREPARING TRAINING OBJECTIVES

Introduction

With the task analysis completed, the next step in the system design process is to develop the training objectives from the information produced by the task analysis. Therefore, the better the analysis, the easier it is to produce good objectives.

There are three main reasons for preparing objectives: (1) There is a need to know exactly what the trainee will be expected to do as a direct result of the training. (2) There is a need to know exactly the conditions under which the trainee will have to perform. (3) There is a need to know exactly what the standards of performance will be. The Instructions systems designer must have this information to make his decisions on content, sequence, method, and media. The same information serves as the basis of the criterion tests used to assess the performance of the students and the system itself.

Training managers need clear statements of course objectives because they must know exactly what the course is to accomplish. Clearly stated course objectives provide training managers with a basis for evaluating the performance of the system. Training managers also have the responsibility for determining requirements for equipment, time, and resources; so, the clearer the picture they have of what the course is to accomplish, the easier it will be to arrange the necessary support. Clear statements of objectives for individual courses are needed to structure an interlocking curriculum. The decisions that must be made when assigning entering trainees and when placing graduating trainees are also dependent on the clear statement of performance objectives.

Another person who must have access to the training objectives is the instructor. He has to know exactly what the trainee is to be able to do as a result of his instruction. Moreover, instructors leave, they go on vacation, and they get sick; there are always new instructors who need to know what is required of them. Precisely stated performance objectives are the best way to communicate their instructional responsibilities to them. Instructors may change, but the course objectives do not. Unless the new instructors have access to detailed course objectives, there is an excellent chance that some of the objectives may become overemphasized, underemphasized, or even lost entirely during the changeover.

Finally, and most importantly, the trainee himself must have access to the information provided by the training objectives. Trainees often spend a great deal of time trying to find out what the instructor really wants them to learn. The instructor is frequently asked, "Do you really want us to learn this? Will this be on the test? You spent a lot of time on this the last period, and yet it wasn't covered on the test at all." These are simply various ways the trainee may try to find out what the instructor wants him to learn. Unfortunately, some instructors actually try to prevent the trainee from finding out exactly what is expected of him because of the mistaken idea that the trainee will thus learn more. If learning is to be efficient, the trainee must know the objectives of the training. He should not have to spend any time trying to find out or guessing what it is he should learn. Without the guidance of clear objectives, he often ends up wasting his time by studying or doing the wrong things. The strength of the trainee's motivation and the quality of his performance is directly related to his knowing exactly what he has to do and how well he has done it when he has finished.

Specifying Behavior

The task of listing and describing the exact performance capabilities expected of the trainee is not an easy one. Care must be taken to avoid descriptions that are either too general or too specific to be of any use. The training objectives must communicate clearly to the students, the instructors, and the training managers precisely what is to be learned and how satisfactory achievement is to be demonstrated. Thus, to be meaningful and useful, training objectives must be described in terms of observable and measurable performance. To say a student will be expected to "know" something, to "understand" something, or to "appreicate" something at the end of a lesson is an unsatisfactory basis for the planning of that lesson. These kinds of verbs furnish merely the starting point for thinking about the instructionsl problem, but they are entirely inadequate as the basis for making instructional decisions. "Understanding the theory of electronics" in no way states what the student is to be able to do at the end of the instruction. What does the trainee have to do to show he understands the theory of electronics? Is he going to design a radio? Is he going to repair a TV set? How does the student demonstrate he understands the theory of electronics? A course in the theory of electronics could last for one day or several years. The course could include a widely different range of content leading to a great variety of knowledge and skills. With a statement as vague and imprecise as "understand the theory of electronics," it is impossible to tell what the objectives of the course really are. Terms like "know," "understand," "appreciate," etc. are used only in general summarizing statements of the objectives, and always have to be supplemented with specific statements of what the trainee has to do to demonstrate he understands, know, or appreciates. For example:

"Understand the decimal system."

a. Translates any fraction into its decimal equivalent.
b. Translates any decimal into its fractional equivalent.
c. Performs addition, subtraction, multiplication, and division with decimal numbers.
d. Accurately describes and demonstrates each of the above processes to the instructor.

Instead of "know" or "understand," say "write," "recite," list," "match," "distinguish between," or any of a variety of more specific terms which describe exactly what a person is to do to show he knows or understands. Action verbs like these are needed to describe overt performance which can be observed and measured.

Describing Conditions and Limitations

In addition to a precise statement of what the student is to be able to do at the completion of training, the conditions and limitations under which the trainee will perform must also be described. If there are conditions which limit or increase the amount of material the student needs to learn when the task is performed under different circumstances, or if the task is easier or more difficult under certain conditions than under others, then those particular conditions must be specified. The conditions that can affect performance generally fall into five categories. First of all, some practical limit has to be set on the range of knowledge and skill that the trainee is expected to demonstrate. For instance, is the trainee to measure any voltage, or only voltages between zero and one hundred? Is the trainee to name all of the parts of the carburetor, or only the most important ones? Must he be able to operate all the different kinds of calculators, or only a Smith, Model 5-A?

Many tasks require tools and equipment which may be generally available and standard, or they may be specialized to a particular task. In any event, the tools needed to perform the task should be listed. Special job aids may be provided for many tasks, thus reducing considerably the amount of material the trainee must learn. There is no need for a trainee to memorize a long procedural sequence if a check list is always available on the job. It may, in fact, be detrimental to safety and reliability to allow the trainee to depend on his memory when performing certain critical operations. Data tables eliminate the need for computing values. Calculators and slide rules can be used instead of computing by hand. Technical manuals and procedural guides contain information to supplement the memory. It is important to know whether special aids will be used during the performance of the task or whether the task must be performed without their help. Therefore, training objectives must identify any special job aids that can be used by the trainee.

The environmental conditions surrounding the performance of a task are very important. Noise, lighting, temperature, and the accessability of the equipment being worked on can affect performance drastically. Working in hot, cramped, poorly lighted, uncomfortable situations is very different from working on an idealized bench mock-up situation. If working under difficult conditions is part of the real job, then these conditions should be specified in the training objectives. Some tasks have special physical demands; for instance, the task may have to be performed while lying down, stooping, kneeling or squatting. If any of these special physical demands change the difficulty of the task or limit the length of time the trainee is able to perform, then the objective should describe the limitations and conditions imposed on the trainee while he performs the task. Of course, difficult or uncomfortable conditions and limitations should not be imposed during the initial stages of learning, but only after the basic knowledge and skill has been acquired. Eventually, however, the trainee must demonstrate his skill at the task under realistic on-the-job conditions. Training objectives must call for performance under realistic job-like conditions to assure a reasonable degree of skill transfer from training to job.

Setting Performance Standards

The final requirement for a training objective is to specify the standards of performance to be met by the trainee. There are generally two standards, accuracy and time, which taken together are a measure of efficiency. Accuracy standards must be stated in terms of how many of the problems must be done correctly, how many of the items within a question must be answered correctly, and within what tolerances a trainee must work. The standards imposed on performance should reflect the realities of the on-the-job situation. For instance, there are some cases when performance must be absolutely error-free because of possible danger to personal safety or when one misstep can lead to serious damage to equipment. However, there are other cases where errors in performance are not critical. Being able to name all the parts in the paper-feed mechanism in a duplicating machine is certainly not as critical a task as reassembling the parts in the correct order. The speed with which the trainee must perform the task must be specified also. If time is important on the job, if a task has to be completed within a certain time limit, then this standard should be reflected in the objective. There are some tasks for which reasonably lenient time limits can be set for training. However, other tasks may have inflexible time limits imposed by concern for personnel safety or equipment damage. To be complete, a training objective must clearly state what is realistically acceptable performance.

Sample Objectives

A well defined training objective must contain the following information: (1) A statement that explicitly describes the overt behavior by which the learned capability can be observed and measured. (2) A statement of the conditions and limitations imposed on the performance. (3) A statement of the standards of performance expected of the trainee. The sample training objectives listed below have these three components (1, 2, 3) identified to illustrate the amount and kind of information needed to specify exactly what the trainee is to do as a direct result of the training.

a. The trainee (1) will match the name of the electronic components with the symbols (2) on a schematic drawing of any radio circuit. (3) All symbols must be correctly identified.

b. The trainee (1) will list in order all the major moving parts (2) in the power train of a standard shift car. The list will be produced from memory with no assistance. (3) The trainee may omit, have out of sequence, or misname no more than one major part.

c. The trainee (1) will start a mobile motor generator, (2) type A-26, using the operating manual as a guide. (3) He must have the generator operating within the specified tolerances (117 ± 3 volts AC and 60 ± 3 cycles) within three minutes.

d. The trainee (1) will perform simple addition on a calculator, (2) Smith Model 5-A. He must set up the machine and carry out the addition of sets of five digit numbers with decimals to three places without the instructions booklet. (3) Ten problems, each with ten five digit numbers, must be added within five-minutes with no procedural or arithmetic errors.

e. The trainee (1) will locate and identify malfunctions in the electrical system of a car. (2) The malfunctions will be shorts and opens induced at logical locations in the system. The trainee may use screwdriver, pliers, multimeter, schematic drawings, and the repair manual. (3) Eight of ten of the malfunctions must be located and identified correctly within fifteen minutes.

Explicitly detailed objectives like those above tremendously simplify the instructional designer's task of determining the types of learning involved and the conditions for learning needed in a training program. For example, if the objective is to start a mobile motor generator, a motor/verbal chain must be learned. If the objective is to match the names of electronic components with their symbols, it is fairly clear that there is discrimination, and possibly concept learning involved. If the objective is to list in order all the major moving parts in the drive train, learning a verbal chain of concepts is involved. Performing a simple addition on a calculator obviously calls for rule using along with motor chaining. Having the trainee locate and and identify malfunctions in the electrical system of a car involves problem solving.

Terminal and Interim Objectives

In most cases, several objectives are needed to support each of the tasks delineated in the task analysis. The components of a job -- duties, tasks, acvities, actions -- form a hierachy ranging from very general duties to very specific actions. Similarly, objectives organize themselves in a hierachy of increasing specificity, from very general objectives to very specific sub-objectives. The general objectives are described in more detail by successively more specific subordinate objectives. General objectives closely parallel the duties set out in a task analysis. For instance, the duty of "engine tune-up" converts directly to the general training objective, "learn to perform an engine tune-up." However, this statement of an objective obviously is too general to be of any value except as a mere starting point in the objective writing process.

The course designer must get down to the task level of description for his information if he is to produce a really useful objective, but even objectives derived directly from tasks often prove to be too general. Thus, the deisgner usually finds himself developing a series of increasingly specific sub-objectives. The subordinate objectives are needed because several different knowledges and skills usually must be learned in support of the overall task objective. In learning to perform a certain task, the trainee may first have to learn to do any or all of the following:

a. To apply general principles that help to solve unexpected problems that arise.

b. To use specific rules that apply directly to the task at hand.

c. To follow a procedure in carrying out the task.

c. To manipulate the tools required by the task.

e. To name and locate equipment components and special tools.

There are basically two kinds of objectives, terminal and interim. Terminal objectives state what the trainee must do to demonstrate mastery of the job and are derived directly from an overall task. Interim objectives, on the other hand, are statements of the subordinate skills and knowledge that must be acquired before the trainee can master the terminal objective.

Statistical Clerk

General Objective - 5

The trainee must be able to perform simple arithmetic operations accurately and quickly on an automatic calculator.

Terminal Objective - 5.1

The trainee will perform addition of decimal numbers on a Smith Calculator, Model 5-A. He must set up the machine and carry out the addition of five digit decimal numbers to three places without the aid of the instructions booklet. Ten problems, each with ten, five digit numbers, must be added in less than five minutes without any procedural or arithmetic errors.

Interim Objective - 5.1a

The trainee, before using the calculator, will demonstrate proficiency in adding five digit, three place decimals by completing test sheet #19. He must finish the test in less than 15 minutes and solve at least 85 percent correctly without outside help. If he does not succeed, he will be given remedial self-study materials and tutorial help to bring him up to proficiency.

Interim Objective - 5.1b

The trainee will identify all the function keys and controls on the keyboard by writing their names in the blanks provided on the special cardboard mock-up. All 22 function keys must be named from memory in less than five minutes with only three errors.

Interim Objective - 5.1c

The trainee will demonstrate to the satisfaction of the instructor the procedure for clearing the keyboard in preparing to operate the machine. If the keyboard does not clear, he will demonstrate the alternate procedure. If the keyboard clears properly the first time, he will explain the alternate procedure for clearing.

Interim Objective - 5.1d

The trainee will demonstrate to the instructor's satisfaction the correct way to set up Auto-Decimal for five digit, three place decimal numbers.

In this case, four interim objectives were needed to specify all the intermediate learned capabilities needed to support the one terminal objective. Each of the interim objectives must be reached before proceeding to the next, and all must be reached before proceeding with the terminal objective. However, regardless of the number of intermediate skills and knowledges that are required, the final pay-off is the capability called for in the terminal objective. The trainee must ultimately be judged on his performance of task-level terminal objectives, not on the separate activity-level interim objectives.

Instruction is basically the management of the conditions of learning. To be effective and efficient, a training system must bring about the greatest amount of change in performance capability in the shortest possible time.

The key decisions during the instructional systems development process are concerned with the planning of suitable conditions for the specific types of learning. Clearly stated and explicitly detailed behavioral objectives are the essential first step toward sound instructional design.

Behavioral Analysis

A detailed task analysis must be made of the tasks to be learned. It should include a description and definition of all skills and knowledge needed to perform the task.* Specific training objectives are then identified for each task and sub-task. Each objective calls for a behavior that can be verified--an activity that can be measured accurately and reliably. By definition a behavioral objective describes precisely (a) what the trainee is to do as a direct result of his learning activity (b) under what conditions and limitations and (c) what standard or level of performance. The learning objectives demand specific trainee responses to specific stimuli. The more closely the training objective matches the desired real-world behavior the better the objective.

Optimum Step Size

The instructional content is organized in relatively small sequential steps, each leading to a desired trainee response (behavioral objective). Each step builds from the preceding response toward the succeeding step and its subsequent responses. Only information and activity directly relevant to the desired behavioral outcome is included. Each step contains neither more nor less instruction than needed for the trainee to successfully perform its stated objective.

Active Responding

The trainee has to interact with the instruction by responding in some specified manner at each step. The response may be replying to a question, performing a task or a combination of both. The response and the stimulus for the response duplicate, as closely as possible, the demand of the real-world task and situation. The response always involves realistic application of the new knowledge or skill, not just a parroting of the facts nor the mere repetition of an action. By forcing the learner to make specific overt responses throughout the learning experience, his behavior is shaped step-by-step until he achieves mastery.

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* See sample task list from Figure C , page III - 47 of this section.

Immediate Confirmation

Immediately following each response, the trainee is given knowledge of results. He finds out at once if his response was right or wrong, and why. Making a correct response and being confirmed in his response strengthens the probability that he will respond appropriately in a like situation later.

Managed Reinforcement

Learning is not left to chance. The trainee is firmly, but subtly, guided toward making the correct response. Thus, the training experience is a series of mostly successful experiences; generally giving positive, not negative, reinforcement. Even though the training situation is highly structured, it still challenges the learner by making him reason and work through the desired response and by allowing for some error.

Learner-Controlled Pacing

The trainees should not be forced to progress at the same pace; however, they may all reach the same objectives and meet the same minimum criteria for success. The trainee is moved on to the next step only after successfully completing the preceding one; thus the learner's responses control the pace of the system. Ideally, the majority of the training is individually paced; but depending on media, content, facilities, resources, scheduling, etc., varying degrees of group-pacing may be imposed without seriously impairing the efficiency of the system. Even when training is completely self-paced, deadlines and mileposts are included to force progress to some degree.

Learner-Controlled Content

The content of the training program adapts itself to the trainee, not the trainee to the content. The learner gets only what he needs to know and only when he needs it. The information given the trainee is appropriate to his needs and ability of the moment. If he doesn't learn, it is not his fault, but that of the system. Materials and tasks are organized to allow the trainee to pick his own best route toward the terminal behaviors. If need be, he is detoured from the main stream of instruction into some remedial tutorial material. On the other hand, he may by-pass material and interim steps any time he can demonstrate the desired terminal behavior. Thus the content will vary considerably from trainee to trainee because the content is largely determined by their individual response patterns.

Validation

The training program is thoroughly tested to make sure it does what it was designed to do. The ovjectives are validated against the real-world; the target population is tested to determine its entry-level skills and knowledges; content, sequence, method and media are validated against trainee performance data; the system is tested lesson by lesson as each is produced, and then tested in its entirety after it is complete. The burden of success rests with the program and not the learner. If the system does not produce trainees who can perform at the desired level of proficiency, then the program must be revised and retested and revised until it does. The analysis of the response data thus provides knowledge of results for the instructor as well as for the trainee.

Learning is the systematic weaving of trainee responses into the very fabric of instruction. Each of the above qualities or elements contains a key word ------response------and its is dependent upon that trainee response for validation

Learning is a two-way communication process, whatever media is used, and provides an interchange of information (feedback) to both instructor and student. This exchange of information must not be passive, but a self-regulatory system, where the program can be changed by the student and the student by the program.

Moreover, because of the enforced participation in the learning process, through practice of the desired behavior, each trainee is learning by doing. Thus the media becomes something more than just a means of displaying or disseminating information. Instead all media become a means of directing and selectively controlling meaningful individual learning activities.

SAMPLE TASK LIST FORM

Training Guide Welder

Training Element 8 Operate Mobile Motor Generator

Task 8.3 Start Motor Generator

Analyst ____________ Date 10/1/72
(Instructor)
Proficiency Code (3c) ____________

Activity Code & Activity Statement	Time Scale in Minutes	Action Statement Code + action + item acted upon + modifiers	Action Determinant (s) Plus Information needed to act	Indication of Response Adequacy Plus Information needed to determine adequacy	Remarks Reference to alternate or emergency procedures Rules, definitions, Precautions
8.3.1 Adjust Control Panel	00		Desire or instruction to perform task	As indicated below	Assume familiarity with control panel Avoid starting with bus bar covers off: personal hazard
		8.3.1.1 Press Power on button	Standard Procedure	Motor starts & makes audible hum, pilot light comes on	
		8.3.1.2 Turn AC Voltage Control Knob as far as required	Standard Procedure	AC voltmeter aligns to 117± 4 volts	
	02	8.3.1.3 Turn FREQ adjustment screw (screwdriver)	Standard Procedure	FREQ meter indicates 60 ± 5 cycles and holds steady	If frequency fluctuates more than ±5 cycles, turn FREQ adjust back to zero; then slowly readjust to 60 cycles. If still fluctuating more than ±10 cycles, shut down generator at once to prevent damage.
	04	8.3.1.4 Depress and hold Power OFF button as long as req.	Emergency Shut Down for fluctuating frequency	Motor stops, no audible hum, pilot light goes out, meter zero	

SECTION IV

IMPLEMENTATION AND EVALUATION

Introduction

Many well designed instructional systems have not lived up to the expectations of the designers because of the lack of specific plans and procedures for installation and implementation. There can be no one set guideline for implementing the wide variety of vocational training programs at all the individual Centers.

This section will discuss the instructor's role in an instructional system, present some guidelines for developing the Instructor's (Individual) Instructional Plan for each course, and describe some potential problems in systems operation. In addition, the policy and procedure for evaluating a training system will be outlined at the end of the section.

The Role of the Instructor

The instructor is a vital part of any instructional system; in fact, he or she remains the key to successful learning. Although the instructional system may typically relieve the instructor of many of his or her former tasks and may change his or her role considerably, he or she is, more than ever, the man or woman who makes the system "work". He or she must be sure that the objectives of the training program are clear to the trainees; he or she must motivate them to participate actively in the training; he or she must guide trainee activity throughout the course; and he or she must continually assess and analyze trainee and system performance. Under the systems concept, the instructor truly becomes

A "manager of learning."

The instructor has two main roles in a system: course administrator and individual tutor-counselor. As course administrator, the instructor must be sure that the required training has available the required supplies, tools, equipment and facilities. The instructor must monitor the activity of all trainees, making sure they have completed the required tasks, and that they have done them to specified standards of performance. The instructor must administer the various evaluation devices to determine the achievement of course objectives, and he or she must gather and tabulate all the performance data of both the trainee and the system. As important as the administrative tasks are, the instructor's role as personal tutor and counselor is certainly more important. The instructor's role as a personal tutor may be new to many classroom instructors. A combination of re-education concerning the instructional system concept and retraining for this new role as a part of a system may be needed for some instructors.

The ultimate goal of an instructional system is to have the trainees achieve all of the objectives. It is, of course, almost impossible from a practical standpoint to develop a training system that will anticipate and provide for all the needs of all the trainees all the time. Instructional systems designers should recognize this fact and not try to achieve perfection. Practical systems can be designed to take care of a majority of the individual differences, but the task of providing for all the minor differences among the average trainees can best be left to the instructor. Some trainees will always have trouble meeting certain objectives, understanding individual points and performing certain tasks, and the trouble spots will be different for different trainees. The instructor must be alert for these trouble spots, and be prepared to give individual assistance where needed. In addition, the instructor will have to deal with the problem of the trainees who are overly fast or overly slow, for no system can take care of the extremes in ability. The instructor must be careful not to do the task or thinking for the trainee; rather he or she should individualize the instruction to meet the trainee's needs. Thus, the instructor must first diagnose the trainee's problems, based on observation of trainee performance and careful analysis of criterion test data; then he or she must provide appropriate assistance. Because an instructional system takes care of most of the needs of the majority of the trainees, the instructor will have the time to help those trainees with special needs.

There is a tendency for some instructors to feel uncomfortable at first in their new role of personal tutor and counselor. In some cases they even revert to being classroom "lecturers" only. For example, when one or two trainees have a problem, some instructors will stop the whole class, step to the blackboard and start lecturing--the one role they know best. "Lecturing" should be avoided because some trainees will already have passed the trouble spot. The instructors should not help the one or two trainees at the expense of the others in the group; instead the instructor should provide individual help for those who need it. Finally, the instructor should make note of the possible weakness in the system and later analyze that portion of the curriculum to see if it should be revised to prevent further problems.

The best way to ensure effective instruction is to provide them with the necessary information and training for their role as administrator, tutor and counselor. Methods for developing specialized instructors should be included as part of course design and development, not as an afterthought.

Preparing the Instructor's Training Outline

A great deal of what goes into the development of a training program does not show up on the surface. In particular, the capabilities and limitations of a training program are not readily apparent to the instructors who will be a part of the system. This information is critical for implementing the program and should be furnished as part of the instructor's training.

Course Description

The following information should be included in the course description:

- Course Title and Dictionary of Occupational Titles (DOT)
- A brief statement as to the purpose and scope of the course, where it leads the trainee, for what job it prepares him.
- A concise outline or brief overview of the contents of the instructional program.
- A physical description of the training program--number and length of lessons, student and instructor materials, training aids, equipment and tools required.

- Appropriate comments concerning the training methods and techniques to be used.

Population Description

The trainee population for whom the training program has been designed and developed should be described. The following information should be included:

- Education and Technical Knowledge demanded of the job.
- Physical Profile required by the job.
- Attitude and Professionsl Ethics required by the job.
- Consideration of age requirements demanded by some occupations.

Training Elements

This very important part of the training program should list all the behavioral training objectives (elements), both interim and terminal, for the course.

Student Evaluation Tests

Copies of all the student evaluation tests should be included in a training program outline. Answers to the tests should appear either on the tests themselves or on separate answer sheets. Directions for administering the tests should also be included, especially for those parts that are performance level items. Rating, scoring, and weighing procedures should also be included. Student evaluation test items should be cross-referenced to the training elements. It should be clear to the reader just what training elements are being tested by which items.

System Performance Data

A training program outline should contain a thorough discussion of the steps taken to test effectiveness of the training program and the data resulting from individual and group testing. Also included should be a description of the trainees used to validate the system--number of trainees, method of selection, age and background data. An account should be given of the conditions under which the tests were given. Appropriate comment should be made concerning the adequacy of the training program in meeting training requirements. Tables should be included to show comparative pre- and post-test results and other performance data. Every effort should be made to describe the validation process and the results completely.

Administering the System

This portion of the training outline should describe how the system can be most effectively and efficiently used. No single list can satisy the wide range of training programs, but the following items are suggested:

- Motivation information and techniques relating to the specific training program and future job possibilities.
- Materials required by the trainees, including tools and equipment.
- Guidance of trainee activities and the role of the instructor.
- Recommendations for associated activities. These should include

methods for making the training more realistic to the trainees. Also included should be suggestions for incorporating and integrating other Center activities into a total training experience for the trainee, relating this training to basic education and work projects on the Center.

- Recommendations for handling individual trainee differences--the special activities and materials that should be provided for fast and slow trainees.
- Instructions for test administration to insure comparable graduates at all Centers.
- Special instructions for training the instructors who will actually conduct the course.

Implementing the System

Many feel that once developed, an instructional system is a finished product, and that no problems should arise during its installation. This is far from true. Problems will occur that are peculiar to systematized courses, and some problems will arise that would come up in any training situation. When portions of the total training program involve self-paced instruction, course managers must be alert to possible scheduling problems. Plans have to be made to accomodate those who finish early. Trainees can be motivated to complete the course quickly by giving the faster trainees special privileges, relief from unpleasant duties, or any of a variety of tangible and intangible status rewards to encourage them to work up to their capabilities.

Unless special care is taken, however, it is also possible to undercut the advantages of self-pacing through improper administration. If the trainee who completes the course or a portion of the course early is put on unpleasant details for the lack of something better for him to do, if he is made to take part in "busy work," or merely given more of the same to do when waiting for the other trainees, then the better trainees will have no motivation to move ahead more rapidly than the others. Thus, the potential of the instructional system will never be reached. Another problem is the occasional trainee who races through the training material, paying less attention to the quality of his or her work than to his or her rate of progress. The instructor must be sure he or she is actually achieving the training objectives rather than just superficially running through the material.

Developing an appropriate set of administration procedures for dealing with trainees in an individualized or self-paced training program requires a great deal of thought and planning. Considerable experience has been gained at some Centers in administering individualized training programs; these Centers have found that some sort of "pipeline" scheduling system, in which the newly-arrived enrollees are fed a few at a time into training as needed to fill in the space left by someone finishing at the other end of the "pipeline," seems to work best. In any event, scheduling procedures must remain highly flexible to meet the needs of a wide range of ability and the continually shifting individual rates of progress.

Continuous check must be made to catch any changes in entry knowledge and skill, particularly in reading and mathematics. A training system is designed to prepare a particular kind of trainee and if the qualifications of the entering trainees change radically, the system will have to be modified to meet the change. To be truly a training system, the content has to be revised and evaluated continuously to adapt to any changing needs of the trainees.

Another potential problem is trainee attitude. Unless the operation and the goals of the training system are explained to the trainee before the start of the course, attitude problems may arise that could otherwise have been avoided. Just as important is instructor attitude. Many recent developments in educational technology apparently ignore the instructor or seemingly minimize his role. It is important to stress that the instructor is the key to success of training systems. Any instructor who does not understand the importance of the role he or she plays in the program and does not act accordingly can seriously weaken its effectiveness.

Managers and course supervisors must be certain that each instructor introduced into the system is given clear guidance for his or her role; course developers must ensure that instructor materials are the best possible. All too many early systematizing efforts have overlooked the need for instructor guidance, instructor materials and lesson plans in particular. Lesson plans may be included in the instructor's training, but it is probably best to publish them separately as they will be needed and used on a daily basis.

Preparing Master Lesson Plans

Master Lesson Plans serve several purposes. They are a check list to help the instructor with the final development of each lesson. They can be used as a teaching guide during the lesson. Master Lesson Plans serve as a common reference point for all instructors who teach the same subject. The Master Lesson Plans serve as a step-by-step guide for the instructor in planning and conducting his local training course.

The first part of each lesson plan should be an overview of the subject, the individual training elements (behavioral training objectives), references tools, equipment lists and related general information. The second part should contain a complete outline of the lesson development. The following suggestions are made for preparing Master Lesson Plans:

- Indicate exactly how each training element is to be carried out, specifying methods, materials and media.
- Include an estimate of the amount of practice and the amount of time required for each area of trainee activity.
- Make a special effort to identify exactly what the instructor will be doing during each phase of the lesson.
- Provide detailed instructions for the conduct of practice sessions.
- Indicate when and where practice materials and equipment are required.
- Make certain that lesson activities are student-centered, spelling out both the instructor's and the trainee's activities.

- Plan the reinforcement schedule.
- Give special instructions on the use of training aids.
- Provide for effective evaluation of trainee achievement of objectives, making full use of the Training Achievement Record (TAR).
- Make definite suggestions on when and where to review and evaluate trainee activities again, using the Training Achievement Record (TAR).
- Provide an introduction and summary for each lesson.

Good Master Lesson Plans tell the instructor what he has to achieve during the lesson, suggests how he can best reach the goals, but leave the details of how to get there up to him. The instructor, as part of the system, must be encouraged to use his own imagination and initiative to constantly better the performance of the system. No training system will succeed unless the instructors are deeply and totally involved.

Evaluation of the Training System Under Classroom Conditions

Up to this point, the evaluation has been a part of the developmental process and the testing has been carried out under formal, almost research-like conditions. Furthermore, the testing and evaluation have been under the direct control of the system designers and conducted under nearly laboratory conditions. Thus, the classroom test is the final phase of the systems development process. Although there is no formalized testing in the usual sense, this final evaluation is crucial because it is the first time the system has had to stand on its own. The operation and evaluation of the system is left in the hands of the customers--the instructional staff and the trainees. While the instructional staff may have participated in the development process to some degree, they have been only assisting the course designers. Now the roles have to be reversed; the instructional staff has to be in full command, with the course designers assisting them. No matter how well the system performed during development, it has to satisfy the customers in the final analysis. There is no formal field trial as such. In fact, there is really no final test of the system. Rather, the system is monitored, evaluated and subsequently revised on a continuing basis as long as it is in use. Careful analysis from the performance data derived from the criterion tests is especially important during the early stages of system installation. Staff and trainee comment should also be taken into account at this stage. However, at least the first class of the first 30 or so trainees should complete the course to allow for staff familiarization and system shakedown before any actual evaluation takes place.

Once the shakedown period is over, performance data on at least 30 trainees should be collected for analysis. Data from within-lesson assessment, as well as end-of-unit criterion tests, should be included. The same sort of analysis and the same standard of performance apply as used in the earlier developmental testing cycle. Wherever fewer than 85 per cent of the trainees fail to meet the stated objectives, the system may need redesigning and revision. However, all other possible sources of trouble should be examined before materials, methods or media are changed, becuase the system already has been thoroughly pre-tested during the development cycle. Special care should be taken to make sure the poor performance is not the result of installation problems, particularly problems with the instructional staff. If the system is being installed and tested at several different centers scattered around the country, one of the potential sources of trouble could be some real deifferences in trainee populations. If the trainees are significantly different, the system will, of course, have to be revised to meet the local needs.

Summary

Neither the system designers nor the local instructional staff should expect to implement a newly-designed training program without running into problems that will call for revision of system content. Local conditions will always affect the system to some degree. Instructional systems can adapt to local and changing needs. Feedback from continuous criterion testing provides a built-in mechanism for adaptive self-correction. Followup studies of the graduates along with regular reviews of the job itself provide a further check on course content. A training system is never a finished product, rather it is a continuing process for meeting the differing and changing needs of the individual trainee.

INSTRUCTORS (INDIVIDUAL) INSTRUCTIONAL PLAN

The Instructors (Individual) Instructional Plan is the program of action that the instructor follows in the training environment. The Plan usually contains the following: name of the task or skill to be learned, aim or purpose, tools and equipment, materials needed, teaching aids, references, suggestions, examples, methods of presenting the task or skill, ways for the trainee to practice or apply the skills, a test covering the presentation of task and a summary of the high points of the lesson or task. Plans are usually developed in five stages:

- Preparation
- Presentation
- Application
- Verification and/or Evaluation
- Summary

The Instructors who will be using the plans can be classified into two major groups: Instructors who have developed only limited curriculum or monitoring plans, and Instructors who have developed self-teaching, self-paced trainee/activity tasks. In either of the above situations, the following eight steps should be considered when preparing the Instructional Plan. Plans can be designed in any format desired by the individual instructor.

Step 1. Write subject or task title

- Be short, specific and to the point.
- Write information subjects in topic style (something to know).
- Write task titles in the form of an order (something to DO).

Step 2. Write the aim (purpose) of the lesson.

- Write in terms of the trainee outcome.
- Amplify the title by stating specifically what the trainee will be able to accomplish upon completion of the lesson or task.
- Be sure it is a brief statement of the immediate intent of the lessons or task.

Step 3. Prepare Stage II, PRESENTATION

- Prepare the new information or skill to be presented to the trainee.
- Select the methods to present the material.
- Select the teaching aids that will help put over the skill or information.

Step 4. Prepare Stage III, APPLICATION

- Design questions and means of checking trainee's understanding.
- Devise methods of checking trainee's performance level.

Step 5. Prepare Stage IV, VERIFICATION and/or EVALUATION

- Devise the tests to evaluate information or skills.

Step 6. Prepare Stage V, SUMMARY

- Prepare material that will cover only those points of most importance.
- Include methods that will involve trainees in activity.
- Interject the summary material into the lesson at those points where the trainees will need the interaction.

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- Utilize summary as many times as the need arises in each presentation.

Step 7. Prepare Stage I, PREPARATION

- Prepare material that will lead into the presentation.
- Devise methods for arousing the interest of the trainees.

Step 8. Complete the Presentation Heading

- Be sure to include references for those trainees who will be interested in more information on the subject.
- List all aids and materials.

The Training Achievement Record

An Occupational Training Achievement Record has been developed to support each Occupational Training Guide. The Training Achievement Records are available through the U. S. Department of Labor.

The Training Achievement Record (TAR) can be printed on a standard 8½" x 11" file folder. See page IV-18 Figure D for an illustration of the printed folder. Figure E shows the information that is printed on the inside of the folder and Figure F shows the information that is printed on the outside of the folder. (The example shown is that of Automotive Mechanics Helper DOT Code 620.884.) The Training Achievement Record is designed to be used as a permanent trainee profile, regardless of the length of time in a training program. It is also designed for the use of all Center Staff.

Uses for the Training Achievement Record

The Training Achievement Record should serve many purposes for all types of training offered on or off Center. The following, are some of the more important uses that this document can be put to

1. As a document for determining and identifying an individual's progress so that future training tasks can be logically sequenced.
2. A quality control document which furnishes information as to whether there is a need for program changes or changes in instruction methods.
3. A means for continual occupations counseling.
4. A record to determine if the training projects have provided the trainees with the opportunities needed to give them equal and consistant training experiences.
5. A record to assist in determining the need for an Occupational Training Guide (OTG) change.
6. A record for feed-back to the individual trainee regarding the tasks that have been performed.
7. A record for vocational counseling when a trainee's progress is at a standstill.
8. A record for staff utilization to assist and advise the trainees both in terms of immediate learning objectives and long-range occupational goals.
9. A complete training record to assist in job placement and developing job resumes.
10. A record around which can be designed occupational orientation and exploration programs.

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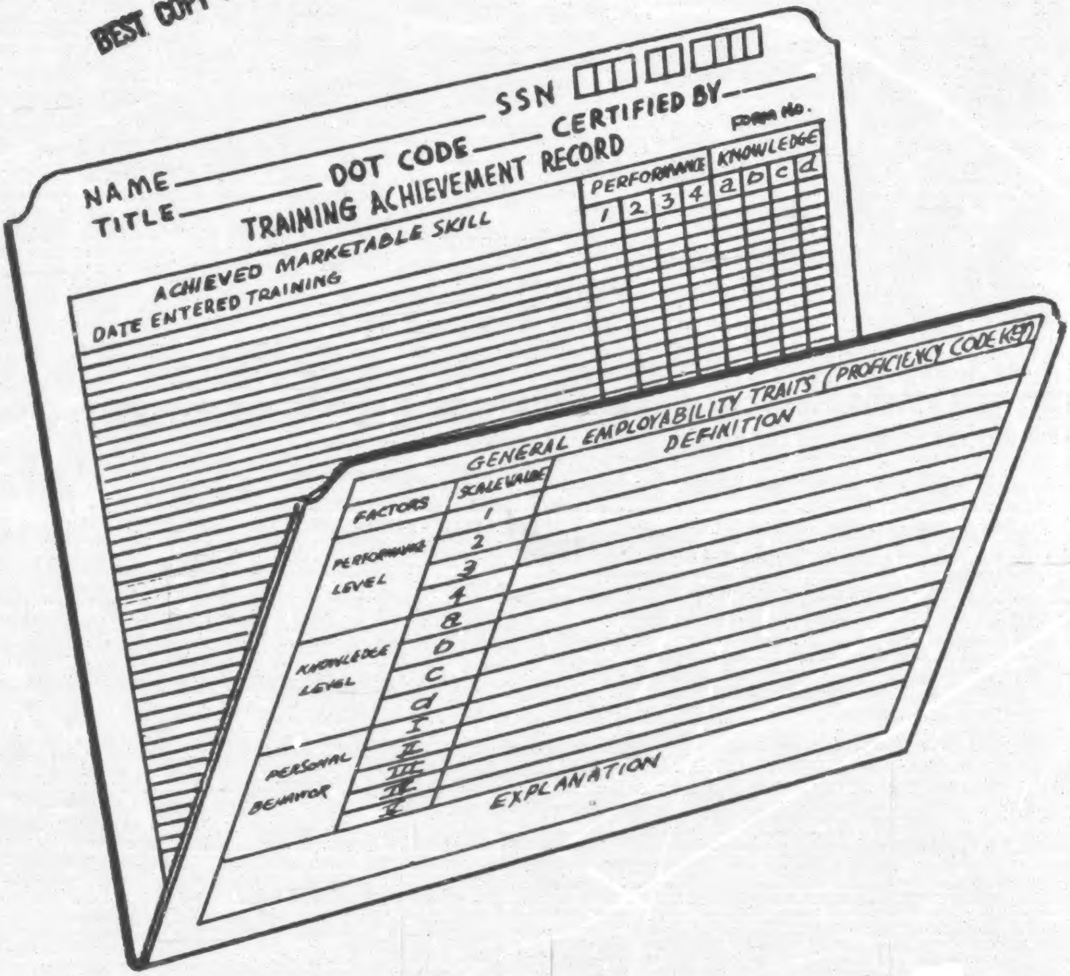

Figure D

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NAME ______________________ SSN ☐☐☐ ☐☐ ☐☐☐☐

TITLE AUTOMOTIVE MECHANIC'S HELPER DOT CODE 620.884 CERTIFIED BY ______________________

TRAINING ACHIEVEMENT RECORD

FORM NO 440.81

ACHIEVED INDIVIDUAL MARKETABLE SKILL DATE INDIVIDUAL ENTERED OCCUPATIONAL TRAINING ____________		PEFORMANCE 1	2	3	4	KNOWLEDGE a	b	c	d
Safety									
1. Use protective clothes, safety precautions with caustics	4d								
2. Use safety precautions w/tools, lifting cars, engines w/jack, lifts	4d								
3. Use safety precautions servicing overheated cooling systems	4d								
4. Use safety precautions handling batteries, battery acid	4d								
5. Maintain/clean work area to keep free from oil and grease	4d								
6. Insure adequate ventilation testing engines inside building	4d								
General									
7. Use/maintain common & special hand tools	3c								
8. Use/maintain standard & special measuring instruments, gauges	3c								
9. Interpret/use repair manuals & parts catalogs	2b								
Electrical Systems									
10. Read/interpret wiring diagrams	2b								
11. Troubleshoot/repair faulty circuitry	3c								
12. Service/install battery	3c								
13. Check, repair, service starter motor	3c								
14. Check, repair, service generator and/or alternator	3c								
15. Check, repair, service ignition system	3c								
Fuel-Air Systems									
16. Check, repair, service carburetor	3c								
17. Check, repair, service fuel pump	3c								
18. Check, repair, service pollutions control system	3c								
19. Check, repair, service exhaust systems	3c								
Cooling System									
20. Check, service, repair radiator	3c								
21. Check, service, repair water pump	3c								
22. Check, service, repair thermostat, hoses and fan belts	3c								
Engine									
23. Disassemble/inspect engine for wear and damage	2b								
24. Use measuring devices to check wear of crankshaft, pistons, cyl. walls	2b								
25. Grind, replace valves, valve seats and valve guides	3c								
26. Replace camshaft bearings	3c								
27. Bore and hone cylinders	2b								
28. Fit piston pins, pistons and connecting rods	3c								
29. Fit main bearings and connecting rod bearings	3c								
30. Systematically assemble engine parts; install engine accessories	3c								
31. Install new or reconditioned engine into vehicle	3c								
Drive Train									
32. Remove, repair and install clutch	3c								
33. Remove, repair and install standard transmission	3c								
34. Remove, repair and install automatic transmission	3c								
35. Remove, repair and install universal joints and propeller shaft	3c								
36. Remove, repair and install rear axle assembly	3c								
Brakes and Front End									
37. Remove, repair and install brakes	3c								
38. Remove, repair and install steering units and linkages	3c								
39. Remove, repair and install springs, shock absorbers & wheel bearings	3c								
Additional Related Training Elements									

EDUCATION. TECHNICAL KNOWLEDGE - JOB PHYSICAL PROFILE		PERFORMANCE 1	2	3	4
1. Ability to solve practical problems	4				
2. Ability to deal with a variety of different situations	4				
3. Interpret instructions written/oral/diagrammatic/schedule form	4				
4. Perform arithmetic, including decimals, fractions, shop math	4				
5. Drive a vehicle; possess valid driver's license	4				
1. Lifts 100 lbs max w/frequent lift/carry objects to 50 lbs	4				
2. Ability to feel differences in temperature, texture, size, shape	4				
3. Ability to hear and speak	4				
4. Ability to stoop, squat, stand in bent positions for long periods	4				
5. Ability to identify and distinguish colors	4				
6. Works indoors/outdoors under extremes of temperature	4				

ATTITUDES AND PROFESSIONAL ETHICS		ATTITUDES & ETHICS I	II	III	IV	V
1. Arrive on the job on time	III					
2. Is on the job every day	III					
3. Does work with even temperament	III					
4. Work cooperatively with others	III					
5. Is courteous to others	III					
6. Work well under supervision	IV					
7. Accept constructive criticism	III					
8. Follow instructions willingly	IV					
9. Maintain appropriate personal hygiene and appearance	II					
10. Show respect for equipment, company and personal property	IV					
11. Demonstrate correct safety practices on the job	IV					

Figure E

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INDIVIDUAL TRAINING COUNSELING (RECORD)

Comments: Date: Trainee Signature Instructor Signature	Comments: Date: Trainee Signature Instructor Signature
Comments: Date: Trainee Signature Instructor Signature	Comments: Date: Trainee Signature Instructor Signature
Comments: Date: Trainee Signature Instructor Signature	Comments: Date: Trainee Signature Instructor Signature
Comments: Date: Trainee Signature Instructor Signature	Comments: Date: Trainee Signature Instructor Signature

GENERAL EMPLOYABILITY TRAITS (proficiency code key)

FACTORS	SCALE VALUE	DEFINITION
PERFORMANCE LEVEL	1	EXTREMELY LIMITED: Can do simple parts of task--Needs to be told/shown how to do most of task--Needs extremely close supervision
	2	PARTIALLY PROFICIENT: Can do most parts of task--Needs help only on hardest parts--May not meet local demands for speed and accuracy--Needs close supervision
	3	COMPETENT: Can do all parts of task--Needs only spot check of completed work--Meets minimum local demands for speed and accuracy--Needs job entry supervision
	4	HIGHLY PROFICIENT: Can complete task quickly and accurately--Can direct others in how to do the task--Needs normal supervision
KNOWLEDGE LEVEL	a	NOMENCLATURE: Can identify parts, tools, and understand simple facts about task--Can identify related basic facts and terms
	b	PROCEDURES: Can name most steps in doing task--Needs help interpreting written instructions--Can explain basic facts and state general principles
	c	TECHNIQUES AND PRINCIPLES: Can explain how and when task must be done; why each step is needed--Can interpret written and oral instructions--Can analyze facts/principles
	d	OPERATING PROFICIENCY: Identify, measure, and use trouble shooting techniques resolving task related problems--Can evaluate conditions and make proper decisions
PERSONAL BEHAVIOR	I	UNRELIABLE, inappropriate personal appearance, disrupting, uncooperative, disinterested, disrespectful
	II	OCCASIONALLY reliable, cooperative, responsible, interested, respectful, and satisfactory personal appearance
	III	USUALLY reliable, cooperative, responsible, interested, respectful and appropriate personal appearance
	IV	CONSISTENTLY reliable, cooperative, responsible, interested, respectful and appropriate personal appearance
	V	EXCEPTIONALLY reliable, cooperative, responsible, interested, respectful and appropriate personal appearance, demonstrates self-assurance

EXPLANATION

Occupational skills can be used alone or together in any combination to define a level of training achievement for a specific job skill. Example: 1b and/or b. General Employability Traits are to be used when racing attitude and professional behavior.

Figure F

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NAME ____________________ SSN ☐☐☐ ☐☐ ☐☐☐☐

TITLE ____________________ DOT CODE ____________ CERTIFIED BY ____________________

TRAINING ACHIEVEMENT RECORD

FORM NO ____________

ACHIEVED INDIVIDUAL MARKETABLE SKILL DATE INDIVIDUAL ENTERED OCCUPATIONAL TRAINING ____________	PEFORMANCE				KNOWLEDGE			
	1	2	3	4	a	b	c	d

EDUCATION TECHNICAL KNOWLEDGE JOB PHYSICAL PROFILE	PERFORMANCE				▨
	1	2	3	4	▨
					▨

ATTITUDES AND PROFESSIONAL ETHICS	▨	ATTITUDES & ETHICS				
	▨	I	II	III	IV	V
	▨					

Figure G

11. A record around which can be designed work experience programs.

12. A record of information which can be used by staff at panel meetings concerned with an individual trainee.

The TAR is a summary of the Training Elements or broad objectives listed in the Occupational Training Guide, and, like the OTG, is not intended to detail training methods, sequence a course of instruction or limit the amount of training given to a trainee.

Developing Training Achievement Records

If a Training Center has developed OTG's, it is the responsibility of the Training Center to develop TAR's for each OTG as well. Blank TAR forms see Figure G, page IV-21, are available for Center to use in the development of the TAR. Use the TAR on a tentative basis until the document can be printed and distributed from Job Corps Headquarters.

The Training Achievement Record as an Evaluation Document

At this point, it can be seen that the Training Achievement Record can be utilized to monitor the quality of the training program and to survey the trainee's progress throughout the entire occupational training program.

A comparative analysis of the achievement of all trainees participating in a given training program can reveal many things. If the analysis shows that the majority of trainees are making slow progress, this may suggest that the instructor needs more training in teaching the subject. Perhaps the instructor has insufficient equipment or media to properly demonstrate the subject in an interesting manner. Or, it may be that the instructional material is poor or inadequate to properly disseminate the subject matter.

It can be seen in the knowledge columns of the Training Achievement Record, see Figure H , whether or not the trainee is keeping pace in knowledge with performance. If not, the instructional staff can easily determine where the trainee needs help. A quick evaluation of the dates entered in the knowledge and performance skill level columns,see Figure H , will reveal the slower or faster trainees.

An evaluation of the entries in the Attitudes and Professional Ethics section,see Figure H , will quickly reveal student attitude toward his or her training.

Finally, an analysis of the TAR provides information for entry-level. A cursory review of the Counseling section,see Figure I , of the TAR should reveal as to possible areas where trainees need special emphasis in any one area to assist in achieving his goals.

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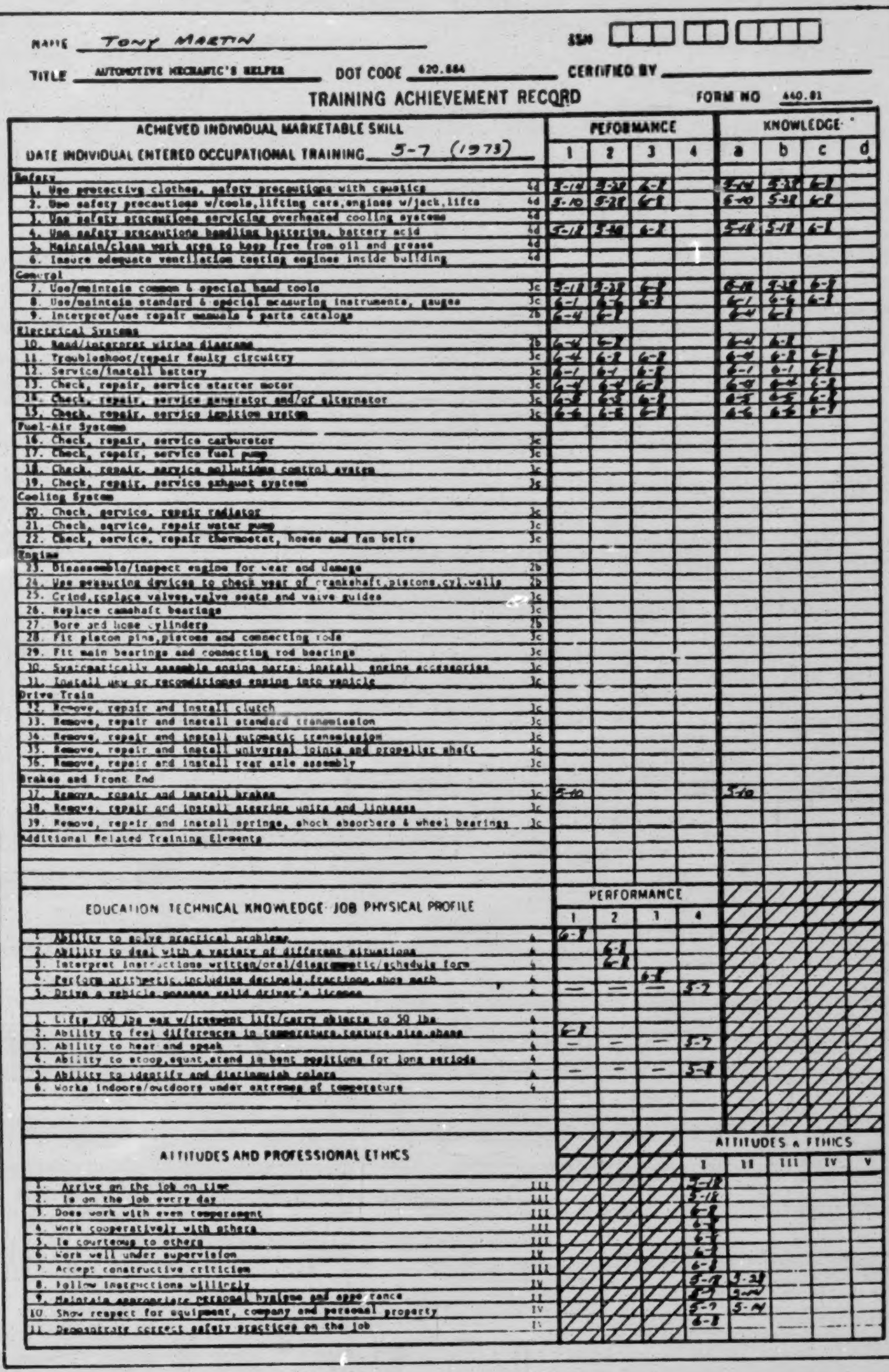

NAME Tony Martin

SSN ☐☐☐ ☐☐ ☐☐☐☐

TITLE AUTOMOTIVE MECHANIC'S HELPER DOT CODE 620.884 CERTIFIED BY ______

TRAINING ACHIEVEMENT RECORD

FORM NO 440.81

ACHIEVED INDIVIDUAL MARKETABLE SKILL DATE INDIVIDUAL ENTERED OCCUPATIONAL TRAINING 5-7 (1973)		PERFORMANCE 1	2	3	4	KNOWLEDGE a	b	c	d
Safety									
1. Use protective clothes, safety precautions with caustics	4d	5-14	5-28	6-8		5-14	5-28	6-8	
2. Use safety precautions w/tools, lifting cars, engines w/jack, lifts	4d	5-10	5-28	6-8		6-10	5-28	6-8	
3. Use safety precautions servicing overheated cooling systems	4d								
4. Use safety precautions handling batteries, battery acid	4d	5-18	5-28	6-8		5-18	5-18	6-8	
5. Maintain/clean work area to keep free from oil and grease	4d								
6. Insure adequate ventilation testing engines inside building	4d								
General									
7. Use/maintain common & special hand tools	3c	5-18	5-28	6-8		6-18	5-28	6-8	
8. Use/maintain standard & special measuring instruments, gauges	3c	6-1	6-6	6-8		6-1	6-6	6-8	
9. Interpret/use repair manuals & parts catalogs	2b	6-4	6-8			6-4	6-8		
Electrical Systems									
10. Read/interpret wiring diagrams	2b	6-4	6-8			6-4	6-8		
11. Troubleshoot/repair faulty circuitry	3c	6-4	6-8	6-8		6-4	6-8	6-8	
12. Service/install battery	3c	6-1	6-1	6-8		6-1	6-1	6-8	
13. Check, repair, service starter motor	3c	6-4	6-4	6-8		6-4	6-4	6-8	
14. Check, repair, service generator and/or alternator	3c	6-5	6-5	6-8		6-5	6-5	6-8	
15. Check, repair, service ignition system	3c	6-6	6-6	6-8		6-6	6-6	6-8	
Fuel-Air Systems									
16. Check, repair, service carburetor	3c								
17. Check, repair, service fuel pump	3c								
18. Check, repair, service pollutions control system	3c								
19. Check, repair, service exhaust systems	3c								
Cooling System									
20. Check, service, repair radiator	3c								
21. Check, service, repair water pump	3c								
22. Check, service, repair thermostat, hoses and fan belts	3c								
Engine									
23. Disassemble/inspect engine for wear and damage	2b								
24. Use measuring devices to check wear of crankshaft, pistons, cyl. walls	2b								
25. Grind, replace valves, valve seats and valve guides	3c								
26. Replace camshaft bearings	3c								
27. Bore and hone cylinders	2b								
28. Fit piston pins, pistons and connecting rods	3c								
29. Fit main bearings and connecting rod bearings	3c								
30. Systematically assemble engine parts; install engine accessories	3c								
31. Install new or reconditioned engine into vehicle	3c								
Drive Train									
32. Remove, repair and install clutch	3c								
33. Remove, repair and install standard transmission	3c								
34. Remove, repair and install automatic transmission	3c								
35. Remove, repair and install universal joints and propeller shaft	3c								
36. Remove, repair and install rear axle assembly	3c								
Brakes and Front End									
37. Remove, repair and install brakes	3c	5-10				5-10			
38. Remove, repair and install steering units and linkages	3c								
39. Remove, repair and install springs, shock absorbers & wheel bearings	3c								
Additional Related Training Elements									

EDUCATION TECHNICAL KNOWLEDGE JOB PHYSICAL PROFILE		PERFORMANCE 1	2	3	4
1. Ability to solve practical problems	4	6-8			
2. Ability to deal with a variety of different situations	4		6-8		
3. Interpret instructions written/oral/diagrammatic/schedule form	4		6-8		
4. Perform arithmetic, including decimals, fractions, shop math	4			6-8	
5. Drive a vehicle possess valid driver's license	4	—	—	—	5-7
1. Lifts 100 lbs max w/frequent lift/carry objects to 50 lbs	4				
2. Ability to feel differences in temperature, texture, size, shape	4	6-8			
3. Ability to hear and speak	4	—	—	—	5-7
4. Ability to stoop, squat, stand in bent positions for long periods	4				
5. Ability to identify and distinguish colors	4	—	—	—	5-8
6. Works indoors/outdoors under extremes of temperature	4				

ATTITUDES AND PROFESSIONAL ETHICS		ATTITUDES & ETHICS I	II	III	IV	V
1. Arrive on the job on time	III	5-12				
2. Is on the job every day	III	5-12				
3. Does work with even temperament	III	6-8				
4. Work cooperatively with others	III	6-8				
5. Is courteous to others	III	6-8				
6. Work well under supervision	IV	6-8				
7. Accept constructive criticism	III	6-8				
8. Follow instructions willingly	IV	5-17	5-28			
9. Maintain appropriate personal hygiene and appearance	II	5-7	5-14			
10. Show respect for equipment, company and personal property	IV	5-7	5-14			
11. Demonstrate correct safety practices on the job	IV	6-8				

TRAINING ACHIEVEMENT RECORD

Figure 11

INDIVIDUAL TRAINING COUNSELING (RECORD)

Comments: **Date:** 6-5 TONY MARTIN HAS SUCCESSFULLY COMPLETED ITEMS 1, 2, 4, 7, 8, 9, 10 WHICH RELATE ONLY TO THE TRAINING ELEMENTS 11, 12, 13, 14, 15 HIS PROGRESS HAS BEEN NORMAL AND IT IS EVIDENT THAT HE WILL CONTINUE TO PROGRESS RAPIDLY. **Trainee Signature** Tony Martin **Instructor Signature** Gretch Irving	**Comments:** **Date:** **Trainee Signature** **Instructor Signature**
Comments: **Date:** **Trainee Signature** **Instructor Signature**	**Comments:** **Date:** **Trainee Signature** **Instructor Signature**
Comments: **Date:** **Trainee Signature** **Instructor Signature**	**Comments:** **Date:** **Trainee Signature** **Instructor Signature**
Comments: **Date:** **Trainee Signature** **Instructor Signature**	**Comments:** **Date:** **Trainee Signature** **Instructor Signature**

Figure I

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STUDENT EVALUATION TESTING

Introduction

Assessment of trainee performance in relation to the stated training objectives is critical to an instructional system. Four kinds of assessment are needed:

1. Immediate and continuous within-lesson assessment to furnish the trainee the feedback that is an integral part of the learning process itself.
2. Immediate and continuous within-lesson assessment to confirm attainment of each capability before proceeding to the next, because each learning experience systematically builds on a preceding learned capability.
3. End-of-lesson and end-of-unit assessment to predict the capacity of trainee to proceed to related or advanced lessons and units.
4. End-of-course assessment to predict transfer of knowledge and skill to the on-the-job situation, and to predict performance in related or more advanced courses.

All four kinds of assessment are very important and must be built into the instructional system right from the very beginning. However, there is another requirement for assessment that is perhaps even more important because it is the very foundation of the systems development process--the validation of the system itself by pretesting it against the stated objectives. The validation process, during which the training system is brought up to a specified level of effectiveness by a "produce-test, revise-retest" development cycle, is a major innovation in training course design. The cornerstone of the validation process is the student evaluation test; thus, next to the training objectives, it is probably the most important design document produced during the systems development process. The concept of using a student evaluation test to measure effectiveness of the instruction rather than to discriminate among the trainees is truly a breakthrough in education and training methodology.

The student evaluation test is used as a quality control instrument by comparing the behavioral demands placed on the trainee during training with those of the actual job for which it is preparing him. To do this, the student evaluation test is used to evaluate the training objectives, to evaluate individual lessons, to evaluate the complete system and to continuously evaluate the system after it has been implemented in the classroom. Group test data gained from sampling performance on the criterion list are used two ways: first to evaluate overall system performance, and secondly, to locate and diagnose trouble spots in the system. (Analysis of an individual trainee's performance on the student evaluation test can quickly locate his trouble spots too.)

Characteristics of a Good Test

To be a true measure of the trainee's learned capabilities, the student evaluation test must be criterion-referenced, comprehensive, valid, reliable, objective, standardized and economical. Of course, no single test can be perfect in all respects because, as always, some of the desirable characteristics will have to be traded off for others. Most instructors are familiar with the above terms, but when used in relation to a student evaluation test these terms take on somewhat different and special meanings. The differences all stem from the fact that this is a criterion-referenced test rather than a norm-referenced test.

Training under the instructional systems concept is ideally "training-to-proficiency;" that is, every trainee is to achieve at least the minimum standards set forth in the objectives. The trainee always has to achieve a specified level of proficiency in the task at hand before being allowed to move on to the next. The individual's proficiency is measured against a predetermined set of absolute criteria, rather than relative to the performance of the other trainees. Norm-referenced tests that rate individual performance against group norms cannot be used to evaluate either the trainees or the training when there are explicitly stated behavioral objectives. Heretofore, test construction methods have concentrated primarily on techniques that are designed to discriminate among trainees and to accentuate their differences by rating performance along a continuum. In an instructional system the goal is not to differentiate among the trainees, but to raise all the trainee's performance to the level specified as acceptable by the objectives. Thus, the main purpose of the student evaluation test is to determine as accurately as possible when a trainee has reached the acceptable level of performance. Criterion-referenced instruction allows considerable latitude in the amount of time taken to reach proficiency, but allows very little latitude in the level of proficiency. There is a fundamental difference between criterion-referenced tests and norm-referenced tests; criterion-referenced testing separates the trainees along a time scale, while norm-referenced testing separates the trainees along a proficiency scale. Actually, criterion-referenced training does allow for some individual differences in performance, but the range of difference is much more restricted than in norm-referenced training. Though all trainees must eventually meet the minimum standards (which may be quite high), there is still room at the top for some sort of rank ordering of the individuals. Morale and motivation still need incentives based at least on relative performance. Because of the restricted ranges of performance measured by a student evaluation test, it is possibly best to use only a pass-fail or satisfactory-unsatisfactory grading. If, however, some sort of ranking is needed to indicate relative performance, an "efficiency of progress index" should be devised which takes into account the amount of time spent as well as the level of proficiency.

The items in the student evaluation test are derived directly from the previously developed training objectives by merely rewording them as questions or requests for demonstrations of specific skills and knowledges. Therefore, if the training objectives have been prepared properly, the task of writing the student evaluation test should be relatively simple. Good training objectives furnish all the necessary information for good test items -- the specific capability to be measured, the conditions and limitations under which the trainee will perform, and the level of proficiency to be achieved. Usually for each objective, both terminal and interim, a companion item must be included in the student evaluation test. Because the objectives are already criterion-referenced, the items derived directly from them will be also. With an item

For every objective, the test will necessarily give comprehensive coverage of all desired behaviors. And, if the objectives have job validity, then the test will also have true validity. Likewise, if the objectives call for behavior that is observable and measurable, the test will probably have a high degree of reliability. If a thorough and accurate task analysis was conducted and the subsequent training objectives were carefully developed, the student evaluation test will, in all probability, be criterion-referenced, comprehensive, valid and reliable. There will, of course, be errors of omission and commission during each phase of the development process preceding the writing of the student evaluation test, and so there is still a need to validate the test.

A good test must be relatively objective; that is, the judgement of the scorer should enter the scoring process as little as possible. Everything else being equal, an objectively scored test which does not permit scorer bias to affect the score is more valid and reliable than a subjectively scored test. Student evaluation testing should treat everyone the same. As nearly as possible, every trainee should have the same opportunity to perform under the same conditions and to the same standards of proficiency. The directions, equipment, conditions, limitations and standards should be the same for every trainee. A test is reliable and valid only if everyone is treated the same.

In a completed and installed training system, by far the greater part of testing time should be confined to self-testing, especially testing for achievement of the interim objectives. Interim objectives, unless very critical, are usually not tested formally. Formal testing generally should be concerned only with the achievement of terminal objectives. Certainly, end-of-unit and end-of-course tests have to be limited to terminal behaviors and probably only key terminal objectives at that.

Types of Tests

Objective paper-and-pencil tests are usually printed and have the directions included right on the form. The trainee either writes his answer on the test itself or on a special answer sheet that comes with the test. Basically, these are knowledge tests with the questions in the form of multiple choice, completion or matching exercises. The questions may be supported with numbers, diagrams, pictures, or any other material that can be printed.

Most commercial aptitude, achievement, or intelligence tests come in this form. The principle advantage of this type of test is objectivity in scoring, for it can be scored quickly and accurately by almost anyone. There are even special answer sheets that can be scored by machine. The number of individuals that can be tested at one time is limitless. Tests such as these can be given to one or a thousand at a time and can even be self-administered and self-scored. The advantages of objectivity and economy make such tests very popular; however, they also have their disadvantages. It is difficult to imagine a paper-and-pencil test that could possibly measure the behaviors involved in operating heavy earth-moving equipment. Just because a trainee can list the steps for starting the diesel engine and can explain how to raise and lower the blade on earth-moving equipment, is no guarantee that he can actually perform the operations. He may be able to "talk a good game," and that is all. Of course, there are paper-and-pencil tasks such as those concerned with reading, writing and computing that can be best measured in such tests, but there are many behaviors that cannot be measured validly with paper-and-pencil tests. The principal use of objective paper-and-pencil tests is to check on the acquisition of the specific supporting knowledge content of interim objectives.

Essay tests generally present a broad question and ask that it be answered at length. The examinee is asked to "write everything he knows" about the questions. Essay tests are relatively easy to prepare, but extremely difficult to score. The subjective opinion of the scorer is a heavy factor in determining the score. In addition to the lack of objectivity, the only reason to use an essay test is to measure the trainee's ability to write. Essay questions should not be used on a student evaluation test unless the training objectives call for a demonstration of essay writing ability.

Oral tests are most often given the way essay tests are conducted, except that the trainee must talk rather than write. The instructor asks the trainee to "tell all he knows" about something. Under these conditions, oral tests suffer from exactly the same difficulties and faults of essay tests. Additonally, an oral test can only be administered to one trainee at a time. However, oral tests do not have to be built around general questions. In the form of a carefully controlled interview, questions can be asked which have straight-forward answers. When short-answer questions are used along with a standardized objective scoring system, oral tests are acceptable as student evaluation tests. In fact, there are many instances where the performance of certain tasks can best be checked by asking the trainee to "show and tell." Having the trainee demonstrate and explain the steps in a complex procedure is often the most logical, practical and efficient way to test competency.

Skill tests require the trainee to perform specific tasks, rather than merely supply information as in the typical knowledge test. Usually the tasks are samples of work associated with a certain job. An obvious performance test for a typist would be to require the trainee to use a typewriter to copy a passage. The performance would then be scored in terms of accuracy and the time needed to complete the job--words per minute correctly typed. Usually, a skill test requires the trainee to use the tools and the equipment he will use on the job. There are also times when special or simulated tools and equipment created just for the training and testing purposes are used. Performance tests generally have to be administered to one trainee at a time and they frequently require considerable time. They are also expensive in terms of manpower, space and equipment, and only rarely can they be self-administered and self-scored. In spite of these disadvantages, performance tests are strongly recommended as criteria for training programs. In fact, if the course designer follows the prescribed steps in arrving at truly behavioral objectives and then derives the student evaluation directly from these objectives the test will of necessity emphasize job-like performance.

Good test construction is absolutely essential to the success of instructional systems development. The entire developmental process can stand or fall on the student evaluation test.

SECTION V

INSTRUCTIONAL RESOURCES AND CURRICULUM DEVELOPMENT ASSISTANCE

Introduction

The first step in the analysis phase of any training program is the identification of the exact expertise of the instructors, teachers and management staff available at the Training Center. It is pointless and futile to inaugurate a training program with unqualified instruction personnel and administrative staff. Nothing is more disasterous to a training program than to have instructors and teachers attempting to instruct a subject or subjects about which they know little or nothing. Not only is it difficult for the instructors but totally frustrating, as well, for the learner. In short, a complete waste of time for everyone concerned. Therefore, if the instructional staff is not capable of teaching the program then steps must be taken to either find qualified instructors or to train the existing staff to handle the subject. Too many training programs fail because of the lack of qualified instructors, not because the trainees lacked a desire to learn. It is important, then, to make every effort to provide the trainees with the best available instructional personnel, individuals well qualified in the latest techniques and methods of training, as well as knowledgable about the latest state-of-the-art in whatever subject is being taught.

Instructional Resource Material

The identification of instructional resource material and curriculum developing assistance material is the second step and is just as important as the first. When commitment is made to spend time and effort on a training program it is extremely important that the reference material used in developing a training program is both technically sound and up-to-date with the present job market.

Few industries want entry level employees that have been trained using outdated material and standards. Here again, many training programs are a failure because the training material used was outmoded and outdated, thus creating trainees who are not qualified to enter as an employee with the minimum entry level requirements. The quality of resource material and instructional staff expertise varies, but there are quantities of materials available which would be extremely useful and relevent for all training programs. Most of the materials are available through trade and professional organizations cost-free or can be obtained for the printing cost. Because the quantity of helpful resources are so numerous, the problem is often one of selecting and sorting the more valuable material from the less desirable material. The search for material should be a continuous effort on the part of all truly dedicated training and instructional management staff to assure that the latest quality instructional material is available to the trainee.

Most Training Centers that are continually updating and revising their curriculum to meet job market needs have established their own catalogues or index of resource and assistance information.

National and local trade associations have been formed for almost every conceivable occupational group in existence. There is no way to quote the exact number of these organizations, however, for an idea of the vastness of the potential resource it has been estimated that there are over 35,000 such organizations. Usually, these organizations are formed by groups of individuals who organize for the purpose of setting standards for their industry and to olve problems that are common to the whole. Many of these organizations ave set training standards for their particular occupation and are willing nd able to offer assistance.

esources of Available Placement Opportunities

n important phase of any training program is to identify and document vailable placement opportunities. This type of information can be obtained rom the industries and businesses where trainees will be employed. Whenever ossible, participate in vocational training conferences, make field visits, orrespond with other manpower programs, military training programs and anufacturers. Solicit the assistance of local school systems, labor unions, ndustrial and professional associations, Department of Labor Manpower dministration and the Bureau of Labor statistics career information publications.

esources of Publications

he following is a partial listing of publications which can be used as xcellent resource material in developing training programs:

. A Handbook for Job Restructuring, Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. Price $ .55. This handbook provides a basic guide for use in restructuring job systems to utilize available manpower resources more effectively. The methodology described in this handbook is a product of the continuing research on occupational data collection, evaluation and presentation carried on by the U. S. Training and Employment Service.

2. Occupational Manpower and Training Needs, Bulletin 1701, Department of Labor Statistics. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington D. C. 20402, Price $ .75. This bulletin presents four key elements to evaluate training needs.

   a. Projections of the number of workers required in each occupation.
   b. Estimates of needs to replace workers who die, retire, and where data allow, who transfer to another occupation.
   c. Data on output from various training programs.
   d. Information on ways workers prepare for occupations.

   In this report, the Bureau of Labor Statistics has assembled data, including gaps and imperfections, to help those responsible make decisions on education and training programs.

3. U. S. Manpower in the 1970's, Opportunity and Challenge, For sale by the Superintendent of Documents, Government Printing Office, Washington D. C. 20402, Price $ .55.

   This booklet contains information about manpower activities in the 1970's and the constant change that goes on in workforce patterns. Major and long-range trends that can be seen at the present time, and those important changes for the future are also discussed in this booklet.

4. Handbook for Analyzing Jobs, For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington D. C. 20402. Price $2.50

A structured procedure for obtaining and recording job analysis data is presented in this handbook. Through these concepts and techniques, current and comprehensive information about job and worker requirements can be accumulated for present and future programs concerning development and utilization of manpower potential.

5. Occupational Employment Patterns for 1960 and 1975, Department of Labor, Bureau of Labor Statistics, Bulletin 1599. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington D. C. 20402. Price $2.25.

This report contains estimates of the occupational composition of employment by industry projected to 1975. Occupational profiles were prepared for 16 industries which include all types of economic activity. The percent of total employment in each industry was developed for about 160 occupational categories classified into 10 broad occupational groups which comprise all types of work.

Information on the number of those persons currently employed in specific occupations and estimates of future employment requirements by occupation are of increasing concern to vocational education.

6. Occupational Outlook Handbook, Department of Labor, Bureau of Labor Statistics, Bulletin 1700. For sale by the Superintendent of Documents, Washington, D. C. 20402. Price $6.25.

The Occupational Outlook Handbook is the major publication resulting from Bureau of Labor Statistics research program in occupational and manpower trends. Published every other year, this handbook contains job descriptions and employment outlook information for white-collar, blue-collar and service occupations. This publication is designed as a basic reference source for vocational counselors and manpower planners. Information in this handbook is based on data received from industry officials, labor organizations, trade associations, professional societies, government agencies and other organizations.

7. The U. S. Economy in 1980, A Summary of Bureau of Labor Statistics Bulletin 1673. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington D. C. 20402. Price $ .65. In this bulletin, the Bureau of Labor Statistics looks 10 years ahead at the growth and composition of the economy, its need for workers, and the likely supply of manpower. This bulletin contains highlights of the Bureau of Labor Statistics projections and is intended to be an overview, limited for the most part, to major sectors of the economy of the U. S. Complete statistical detail concerning labor force output, productivity and employment in excess of 250 individual industries and detailed occupations is contained in this bulletin.

8. Worker Traits Training Unit, Department of Labor published by California Department of Human Resources Development. This training unit has been developed to effect the maximum use of the "worker traits" section of the Dictionary of Occupational Titles in career development, particularly as it relates to Employment Service

operations. This information will be useful to those persons concerned with the counseling of individuals in various fields of work. The main objective of this training unit is to provide some basic tools for understanding worker potential in terms of universal job requirements.

9. Tomorrow's Manpower Needs, Department of Labor, Bureau of Labor Statistics. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington D. C. 20402. Price $1.50. Bulletin 1606, was designed to provide up-to-date information on national projections of manpower requirements for use in making state and area manpower projections.

The publication contains information concerning national manpower projections, together with guidelines for an analysts use in developing or improving local manpower projections.

10. Relating General Education Development to Career Planning, For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington D. C. 20402. Price $ .50.

This guide is designed primarily for the use by Training and Employment Service personnel and affiliated State agencies engaged in such activities as interviewing, counseling, and planning educations programs.

11. Vocational Education and Occupations, For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Price $2.25.

Contained in this document is information which will be helpful in evaluating, comparing and improving the results of occupational education. Also, this publication contains information useful in designing curriculum and planning education facilities in relation to labor market needs for various occupations, as well as for guidance and counseling of youth in making appropriate career and vocational choices.

12. Index to Publications of the Manpower Administration , This index covers about 600 publications, reports and articles currently being published. Most items are listed only once by major subject. In a few cases there are multiple entries, notably the Manpower Reports and Manpower Magazine. Chapters and major subdivisions of the Manpower Reports and all articles in the Manpower Magazine are indexed separately. Copies of publications may be obtained free by writing the Inquiries Section, Office of Information, Manpower Administration, Department of Labor, Washington D. C. 20210.

OCCUPATIONAL TRAINING GUIDES

efinition of an Occupational Training Guide

n Occupational Training Guide is a document that contains information which tates the minimum amount and type of training that a trainee must accomplish o become employable at minimum entry-levels in a specific occupational title. he Dictionary of Occupational Titles was used as the reference source in lefining occupational titles.

he availability of training material through professional organizations and rade associations has been touched upon. At this point, some discussion should e given to the use and availability of the Occupational Training Guides which re published and can be obtained through the U. S. Department of Labor, Manpower Administration, Job Corps. The Occupational Training Guides reflect the inimum essential training requirements for job entry level. Each Training uide was reviewed by one or more industrial or professional organizations for ts content as well as for its quality in assuring that the trainee achieves he proper training in order to be employable in a particular skill. An Occuational Training Guide (OTG) is available for most of the occupational training rograms given through Training Centers. In those cases where an OTG has not een developed, the Training Center should accomplish the task of developing heir own using the suggested methods of development as described in this handook. The OTG identifies the minimum training elements a trainee must accomplish o be a completer and to become employable at a specific job entry level in a iven occupation.

he training elements comprising the total training guide were developed from the Dictionary of Occupational Titles, DOT Supplements, Occupational Outlook Handbooks, Handbook for Analysing Jobs, and other career guidebooks prepared by the U. S. Department of Labor, Manpower Division. Additional and supplementary OTG training elements were derived from input from industry, business, unions and other manpower training and Department of Education training programs.

The Occupational Training Guide serves five primary purposes:

* The OTG states the general occupational tasks necessary for a trainee to successfully perform at an entry level in an occupational area.
* The OTG states the general Education and Technical Knowledge necessary for a trainee to successfully accomplish the occupational tasks.
* The OTG states the general Job Physical Profile necessary for counseling trainees in each occupational area, as well as providing guides for developing a realistic training curriculum.
* The OTG states the general Attitudes and Professional Ethics necessary for each trainee to develop to perform as an entry-level employee, as well as providing guides for developing a realistic training curriculum.
* The OTG indicates the level to which each trainee must be trained in all Training Elements of an occupational selection. Therefore, the OTG identifies and establishes the minimum requirements for program completers.

The OTG is a series of broad-guaged objectives for a total occupational training system, including Orientation, Occupational Exploration, Training Analysis, Planning, Evaluation and Work Experience. OTG's also provide training staff with a guide to use in excluding all the nice-to-know, non-essential, irrelevant instruction that has a tendency to creep into all training curriculum. Although the OTG serves as the basic curriculum guide, it is not intended to detail training methods, sequence a course of instruction or limit the amount of training given to a trainee.

Developing Occupational Training Guides

Occupational Training Guides have been developed to service the majority of training programs throughout Job Corps. If a Training Center plans to offer training, or is currently offering training in occupational areas for which OTG's have not been developed, it is the responsibility of the Training Center to develop OTG's for each of these areas.

Once the decision has been made that a certain training program is feasible and desirable, an analysis of the job prerequisites should be made. A determination must be made as to what kinds of performance, knowledge and skills, physical conditions and limitations, and standards of attitudes and ethics, are required by the employer.

Newly developed or revised OTG's made by Training Center staff should remain as tentative OTG's until they are approved through proper channels. Upon approval, the National Office should publish and distribute the new documents and up-date the index of this Guidebook.

An OTG contains a series of interrelated, interacting, minimum training elements that are designed to assist Training Center Staff in developing a specific training objective.

Use the description of an occupation that appears in the Dictionary of Occupational Titles as a starting point in developing an Occupational Training Guide. Generally the description indicates all the various facets of a particular occupation. However, some occupational area may require that you research other resources for a more finite description. Once a description has been determined, use all possible resources of information available to support the content of the material that is used in developing your new Occupational Training Guide.

Detailed Instructions for Preparation of OTG's

Research and Task Analysis procedures must be accomplished prior to developing a tentative OTG. Group all Training Elements insofar as possible by duty and elements of a skill or occupation major. Group Educational and Technical Knowledges, Job Physical Profiles and Attitudes and Professional Ethics separately. Use prudence in wording Training Elements in order to avoid frequent revisions or changes for the purpose of clarification. Normally, OTG's should be revised only to keep abreast of major changes in industry or reclassification of a DOT code.

Each Training Element should identify a clear-cut task and knowledge requirement in words which are commonly understood. Do not outline procedures and steps for performing tasks, etc. Such detail belongs in the Course Training (Analysis) Plan, Instructor's (Individual) Training Plans and Trainee's Activity/Task Sheets. Each Training Element and associated proficiency code shown must be adequate, complete, realistic and attainable. The degree of detail is a matter of judgement and coordination. Based on the requirements of the task analysis, each Training Element should describe a unit of work to be performed by an individual to achieve a specific objective. Each Training Element should begin with a verb in the present imperative tense. Example: CHECK, OPERATE, CLEAN, TYPE, etc. not checks, operates, cleans or types. Each Training Element should stand alone as a complete sentence. The introductory phrase "the trainee will" is considered understood at the beginning. Avoid redundant, qualifying phrases, such as: in accordance with, when appropriate, as required, as necessary, etc. Avoid as far as possible ambigous words such as: assist, coordinate, recommend, determine, etc. Use short words rather than long words of expression. Example: FILL OUT TRIP TICKETS AND TRAFFIC REPORTS, not accomplish necessary reports and forms involved in the process of driving a motor vehicle. Avoid Training Elements that are obviously too specific. Example: Turn ignition key, sharpen pencil, peel onions. Avoid Training Elements that are too general. Example: Supervise subordinates, observe safety precautions, etc. Code each Training Element with a combination of the Performance Level and the Knowledge Level scale value code.

Developing Additional Training Elements at Training Centers

Training Centers should utilize the published OTG as the minimum training requirements for a specific work skill. The OTG as published, does not limit the Training Center in adding training elements if more are required to upgrade or improve training. Training Center staff should add training elements to the OTG, if necessary, to assist trainees in becoming better trained and a more productive employee. Training Center staff should take the responsibility of adding additional training elements to the OTG that are peculiar to a locale or a region. Do not delete training elements unless it is planned to develop a new OTG. The training elements listed in each OTG are minimum standards prescribed by industry and business, therefore, deleting any of the training elements would be downgrading the OTG.

PROFICIENCY CODE KEY

An example of a well developed Occupational Training Guide is the Nursing Assistant, OTG #440.104 see figure M page V-25. Each element of the Training Guide, Nursing Assistant, was carefully planned to fit a logical sequence of related training. Each element was given a performance level the trainee must attain as well as an educational level that must be attained. These performance levels are minimum acceptables as determined by industry and business. You will note that the first element of Safety is coded at a level of 4d. These scale values were derived from values obtained from the Dictionary of Occupational Titles as well as from input from Industries representing this specific occupation. The Proficiency Code Key, see figure J page V-20, was developed primarily from these two sources and then submitted to several hundred industrial and professional organizations for their critique and/or approval.

Education and Technical Knowledge Level

The Education and Technical Knowledge levels were also derived from the Dictionary of Occupational Titles. Again, industry offered their critique and/or approval of the master key related to his area. The master for these levels can be seen on page V-21 figure K.

Job Physical Profile Level

Again, these levels were derived from the Dictionary of Occupational Titles with the assistance and critique from industry and business as well. The master for these levels can be seen on page V-23 figure L.

Attitudes and Professional Ethics Level

The fourteen statements which appear at the end of each training standard are the same for all Occupational Training Standards that have been developed. The performance levels (I, II, III, IV, V) are obtained from the Personal Behavior section of the Proficiency Code Key. Again these values were critiqued by industry and business and are considered the minimum acceptable levels for personal behavior while on the job.

Performance Levels

1 EXTREMELY LIMITED: Trainee can do simple parts of the task only, needs to be told or shown how to do most, if not all parts of the task, is extremely limited and requires continuous close supervision. Trainee has been exposed to, but in most cases, cannot meet local demands for speed and/or accuracy.

2 PARTIALLY PROFICIENT: Trainee can do most parts of the task, needs help only on the hardest parts, needs close supervision while performing the most difficult parts and may not meet local demands for speed or accuracy.

3 COMPETENT: Trainee can do all parts of the task, needs only a spot check of completed work and needs minimum supervision to job entry level, meets minimum local demands for speed and accuracy in all aspects of the task.

4 HIGHLY PROFICIENT: Trainee can do task quickly, accurately and efficiently, can work independently as well as explain and demonstrate all parts of the task to other trainees, can supervise others, needs only normal supervision.

Knowledge Levels

a NOMENCLATURE: Trainee can identify items, parts, and tools associated with the simple tasks, can understand simple facts of a task. Trainee can identify and relate basic facts and terms to simple tasks.

b PROCEDURES: Trainee can identify and name most steps in doing a designated task, needs help interpreting detailed written instructions. Trainee can explain basic facts and general principles.

c TECHNIQUES AND PRINCIPLES: Trainee can explain how and when each task must be accomplished as well as why each step of a task is necessary, can interpret written and oral instructions associated with each task. Trainee can analyze facts and principles pertaining to each task.

d OPERATING PROFICIENCY: Trainee can identify and evaluate task performance and operation, measure results and use trouble-shooting techniques to solve related problems. Trainee can evaluate conditions and give directions and make proper decisions pertaining to tasks and systems.

Personal Behavior

I UNRELIABLE, has inappropriate personal appearance for the job atmosphere, is disrupting, uncoorperative and disinterested in the training environment and is disrespectful to others.

II OCCASIONALLY reliable, coorperative, responsible and interested in training activities. Trainee is occasionally respectful to others and has satisfactory personal appearance.

III USUALLY reliable, coorperative, responsible and interested in training activities. Trainee is usually respectful to others and has appropriate personal appearance.

IV CONSISTENTLY reliable, cooperative and assumes responsibility. Trainee consistently is interested in training activities, shows respect for others and consistently maintains appropriate personal appearance.

V EXCEPTIONAL reliability, cooperativeness and responsibility to others and the tasks demonstrated. Trainee is totally interested in training and respectful to all. Trainee has personal appearance beyond question with the highest degree of self-assurance.

GENERAL EMPLOYABILITY TRAITS (proficiency code key)

FACTORS	SCALE VALUE	DEFINITION
PERFORMANCE LEVEL	1	EXTREMELY LIMITED: Can do simple parts of task--Needs to be told/shown how to do most of task--Needs extremely close supervision
	2	PARTIALLY PROFICIENT: Can do most parts of task--Needs help only on hardest parts--May not meet local demands for speed and accuracy--Needs close supervision
	3	COMPETENT: Can do all parts of task--Needs only spot check of completed work--Meets minimum local demands for speed and accuracy--Needs job entry supervision
	4	HIGHLY PROFICIENT: Can complete task quickly and accurately--Can direct others in how to do the task--Needs normal supervision
KNOWLEDGE LEVEL	a	NOMENCLATURE: Can identify parts, tools, and understand simple facts about task--Can identify related basic facts and terms
	b	PROCEDURES: Can name most steps in doing task--Needs help interpreting written instructions--Can explain basic facts and state general principles
	c	TECHNIQUES AND PRINCIPLES: Can explain how and when task must be done; why each step is needed--Can interpret written and oral instructions--Can analyze facts/principles
	d	OPERATING PROFICIENCY: Identify, measure, and use trouble shooting techniques resolving task related problems--Can evaluate conditions and make proper decisions
PERSONAL BEHAVIOR	I	UNRELIABLE, inappropriate personal appearance, disrupting, uncooperative, disinterested, disrespectful
	II	OCCASIONALLY reliable, cooperative, responsible, interested, respectful, and satisfactory personal appearance
	III	USUALLY reliable, cooperative, responsible, interested, respectful and appropriate personal appearance
	IV	CONSISTENTLY reliable, cooperative, responsible, interested, respectful and appropriate personal appearance
	V	EXCEPTIONALLY reliable, cooperative, responsible, interested, respectful and appropriate personal appearance, demonstrates self-assurance

EXPLANATION

Occupational skills can be used alone or together in any combination to define a level of training achievement for a specific job skill. Example: 1b and/or b. General Employability Traits are to be used when rating attitude and professional behavior.

Figure J

EDUCATION AND TECHNICAL KNOWLEDGE MASTER

Level 1. 2b

1. Carry out simple one or two step instructions.
2. Deal with standard tasks on the job.
3. Perform addition and subtraction with two digits; perform simple multiplication and division.
4. Read, write and speak simple sentences.

Level 2. 3b

1. Carry out detailed but uninvolved written or oral instructions.
2. Deal with problems defining a few specific tasks of standard practices.
3. Use arithmetic to add, subtract, multiply and divide whole numbers.
4. Read, write and speak, using complex sentences.

Level 3. 4c

1. Carry out instructions furnished in written, oral or diagrammatic form.
2. Deal with problems defining numerous specific tasks from standard practices.
3. Make arithmetic calculations, including fractions, decimals and percentages.
4. Read and interpret technical materials.

Level 4. 4d

1. Deal with a variety of instructions furnished in written, oral, diagrammatic or schedule form.
2. Perform ordinary arithmetic and apply algebraic and geometric principles in practical application.
3. Read and interpret technical materials.
4. Prepare reports and summaries conforming to good practices of punctuation and grammar.

Level 5. 4d

1. Apply principles of logical thinking to define problems, establish facts and draw valid conclusions.
2. Deal with several abstract and concrete variables.
3. Apply knowledge of advanced mathematics.
4. Evaluate written material and write on theory and principles.

Figure K

JOB PHYSICAL PROFILE MASTER

S	Able to lift 10 lbs. maximum; sit most of the day
L	Able to lift 20 lbs. maximum; carry objects up to 10 lbs; walk or stand most of the day
M	Able to lift 50 lbs. maximum; carry objects up to 25 lbs; walk or stand continuously
H	Able to lift 100 lbs. maximum; carry objects up to 50 lbs.; walk and stand continuously
VHW	Able to lift in excess of 100 lbs. maximum; carry up to 50 lbs. or more

2	Able to climb, maintaining body equilibrium
3	Able to use back muscles and legs to stoop, kneel, crouch and crawl
4	Able to use fingers, hands and arms for reaching, handling and feeling
5	Able to hear oral communications and express or exchange ideas by speaking
6	Able to see both near and far and to function efficiently in depth perception, vision field, accomodation and color vision

I	Work indoors, protected from weather conditions
O	Work outdoors, without protection from weather
B	Work both indoors and outdoors in equal amounts

2	Work under conditions of extreme cold or temperature variations
3	Work under conditions of extreme heat or temperature variations
4	Work in contact with wet or humid conditions
5	Work under constant or intermittent noise conditions
6	Work under conditions where physical hazards exist
7	Work under conditions where atmospheric hazards exist

Figure L

Department of Labor
Washington, D. C.

Occupational Training Guide 440.104
January, 1973 DOT Code 355.878

NURSING ASSISTANT

TRAINING ELEMENTS	Level
Safety	
1. Practice good personal hygiene, wear appropriate clothing and identification	4d
2. Comply with sanitary standards and safety rules	4d
3. Practice safety with medical equipment and procedures	4d
4. Use sound techniques for moving patients through the use of good body mechanics	4d
5. Understand and use established techniques for cleaning, sterilizing and preparing treatment supplies before use	4d
General	
6. Understand and use medical terminology and abbreviations appropriately	3c
7. Report all unusual conditions or reactions to professional nurse in charge	3c
8. Know functions of body organs and systems and principles of patient care	3c
9. Observe, report and record significant data accurately	3c
Patient Protection	
10. May assemble small equipment and supplies in preparation for various diagnostic or treatment procedures performed by nurse or physician	3c
11. Adjust side rails, apply restraints and adjust bed height	3c
12. Wash hands, open sterile packages, pour sterile solutions and handle sterile equipment	3c
13. Carry out isolation techniques in caring for patient	3c
14. Explain and apply smoking regulations	3c
Patient Hygiene and Comfort	
15. Change soiled linens and clothes	3c
16. Make patient's bed; occupied, unoccupied and anesthetic	3c
17. Assist patient with oral hygiene, comb hair and shave male patients	3c

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NURSING ASSISTANT cont.

TRAINING ELEMENTS	Level
18. Give patient backrubs	3c
19. Give general skin care to patients	2b
20. Use supportive and comfort devices, i.e., sheepskins	3c
21. Assist patient with movement, walking, getting in or out of bed, transfer to stretcher or wheelchair	3c
22. Receive and deliver items, mail and messages to patient	3c
23. Count, sign for and place patient's personal possessions in safe place	3c
24. Assist patient in using urinal, bedpan or bedside commode	3c
Patient Feeding	
25. Position patients for meals; feed if required	3c
26. Prepare and give between meal nourishment of liquids and toast, crackers, etc.	3c
27. Serve and collect food trays	3c
Treatments and Procedures	
28. Irrigate rectum	3c
29. Connect, check and maintain catheters and tubing	3c
30. Empty drainage bottles and bags	3c
31. Care for specimens	3c
32. Assist with and/or apply Ace bandages and elastic stockings	3c
33. Administer sitz bath	2b
34. Check and maintain drainage tubing with suction	2b
35. Apply ice bags, heating pads, thermal blanket and hotwater bottles	3c
Diagnostic Activities	
36. Count pulse and respiration and record	3c
37. Take oral and rectal temperature and record	3c
38. Collect urine and stool specimens; deliver to laboratory	3c

NURSING ASSISTANT cont.

TRAINING ELEMENTS	Level
39. Test urine for sugar and acetone	3c
Oral and Written Communication	
40. Record vital signs, input and output on chart	3c
41. Record observations of behavior, responses to therapy and care	2b
42. Talk with patient, obtain and give information	2b
43. Orient patient and family to hospital routines and regulations	2b
44. Read and obtain information on patient's condition and care from charts	2b
ADDITIONAL RELATED TRAINING ELEMENTS	

NURSING ASSISTANT cont.

EDUCATION AND TECHNICAL KNOWLEDGE	Level
1. Carry out instructions furnished in written, oral or diagrammatic form	3b
2. Deal with problems differentiating between numerous specific tasks from standard practices	3b
3. Make arithmetic calculations, including fractions, decimals and percentages	3b
4. Able to read manuals and write reports, using proper sentence structure	3b
JOB PHYSICAL PROFILE	
1. Able to lift 20 lbs. maximum; carry objects up to 10 lbs.; walk and stand continuously	4
2. Able to use back muscles and legs to stoop, kneel, crouch, crawl	4
3. Able to use fingers, hands and arms for reaching, handling and feeling	4
4. Able to hear oral communications and express or exchange ideas by speaking	4
5. Work indoors, protected from weather conditions	4
6. Work under conditions where physical hazards exist	4
7. Work under conditions where atmospheric hazards exist	4

NURSING ASSISTANT cont.

ATTITUDES AND PROFESSIONAL ETHICS	Level
1. Demonstrate correct safety practices on the job	IV
2. Maintain appropriate personal hygiene and appearance	IV
3. Arrive on the job on time	III
4. Is on the job every day	IV
5. Perform work of consistently good quality	IV
6. Function cooperatively with fellow workers	III
7. Treat others courteously	IV
8. Work with even temperament	III
9. Accept constructive criticism	III
10. Follow instructions willingly	IV
11. Deal well with supervision	IV
12. Willingly work unusual schedules when required	IV
13. Handle proprietary information discreetly; respect confidences	IV
14. Respect worth of equipment, company and personal property	IV

SELECTING INSTRUCTIONAL MATERIAL

Introduction

Media selection is the one area in which there is very little systematic knowledge on which to base design decisions. Although there have been tremendous advances in training equipment and audio-visual devices, there has been little parallel advancement in the knowledge needed for deciding when, where and how to use the different media. Media decisions are mostly educated guesses, though rough guidelines can be drawn to help the instructional designer. Although the guidelines are not very definitive, they can at least identify the situations in which the different media are not effective. Moreover, there is really no feasible way in which the media decisions can be empirically validated against performance data. The cost in time, manpower and money usually prohibits the testing and subsequent revision of media alternatives for an instructional system. The test-revise-retest cycle that a system undergoes during production can tell the designer in general terms whether or not the selected media is effective, but not whether there might be a more effective media for a particular situation. As a matter of fact, the final decisions on media are usually based as much on cost analysis as on effectiveness. In a way, that is as it should be--the least costly medium that can do the job adequately is probably the best choice.

Media Function

In the general sense of the term, media are merely means of displaying information, devices that simply pass along the information without necessarily affecting either the information or the viewer. A trainee can scan a printed page, half-listen to a lecture, or doze through a training film without learning a thing. The media merely make information available, they do not teach. When learning does take place, it is because of what the learner does with the information, not because of any particular media used to display the information. If the information is organized in a way that forces the trainee to act upon and respond to the information being displayed, learning will take place regardless of the medium. The need for constructing an instructional system with two-way communication loops which require the trainee to respond to the displayed information. When system principles are applied, all media (texts, workbooks, films, television, lectures, etc.) become more than just a means of displaying information; instead, the media become the means of eliciting and controlling meaningful individual activity-learning.

Oral and printed communication can carry most of the functions of an intructional system, but they are limited to presenting stimulus situations in verbal terms. It is, for example, rather difficult to describe a 3500 cycle tone; thus, objects, pictures, sounds, etc. are needed to supplement the verbal descriptions. Oral presentations can be organized into a highly effective two-way communication system. Printed media can be organized to convey verbal information just as well as often more rapidly than oral communication. In combination, the different media (oral communication with visuals, printed material with visuals, motion pictures, slide-tape presentations, teaching machines, etc.) gain more capability by taking advantage of the special attributes of each, and thus become more useful than any one medium by itself. There also are advantages to be derived through the appropriate sequencing of training media. The proper timing of the presentation of training media may be as important as correct selection of such media. For example, transparencies would be used first for familiarization, followed by a period of training on a procedures trainer or mock-up, with training being completed on the actual equipment. The exact period of time to be spent in each of these training phases would be adjusted according to the progress of the individual trainees.

Vocational and technical training places two important limitations on the use of printed material. First of all, the instruction should be conducted under workshop, on-the-job conditions as opposed to a classroom, textbook and lecture situation; thus dependence on printed materials should be kept to a minimum. Secondly, low verbal aptitude and skill on the part of some of the trainees can interfere drastically with the communication process. Particular care must be taken to keep printed materials at the right comprehension level for the trainees. Frequently, though, a trainee with a low-level reading comprehension has surprisingly high listening comprehension. This is the one reason why slide-tape presentations (teaching machine) and systematized lecture-demonstrations are often better than printed material.

Media Selection

When instructional system principles are imposed on combinations of media, there actually is little difference in the capability of the different media to facilitate learning. If trainee response and knowledge of results, etc. are built in, a slide-tape presentation, a lecture demonstration, an illustrated programmed text, or a step-by-step demonstration film can be equally effective for most kinds of learning. The choice is not so much between media as it is between individually-paced or group-paced instruction; specifically, how much the content and pace of the instruction is to be controlled by the individual trainee. Although group-controlled instructional systems adapt to the individual trainee's needs to a degree, self-study situations place the content and pace of the instruction almost entirely under the control of the individual trainee. Ideally, the more the instruction is "individualized" the better; however, there are many practical considerations that limit how far the designer can go in that direction. The more the instruction is individualized, the more expensive it is in terms of manpower, time, equipment, facilities and materials; both while the system is developed and while it is being used. Truly individual instruction is more expensive for the same reasons it is more effective than group instruction -- each trainee must have his own material, equipment, facilities and tutorial help when he needs it, not when it can be scheduled for administrative convenience.

On the following pages are descriptions of various training media classified according to the training objectives for which they can be used most effectively.

TO IDENTIFY AND LOCATE

Transparencies

Transparencies (slides, overheads, etc.) are very effective primarily because they are very flexible in the way in which they can depict items of equipment. Cost and preparation time factors are also quite favorable for transparencies.

Training Charts

As an aid to meeting this training objective, training charts differ very little from transparencies. For presentations at a number of training locations, training charts may be preferred over transparencies because of the need, with transparencies, for projection equipment at all the locations.

Simulators, Procedures Trainers, Mock-ups, Teaching Machines

Any one of these aids may be used quite effectively in teaching identifications and locations. However, because of cost considerations, they generally cannot be justified in terms of this training objective only.

TO PERFORM SKILLED PERCEPTUAL-MOTOR ACTS

Simulators

Simulators are quite useful for this training objective if the control-display relationships are presented with considerable fidelity. This is particularly true where the action being learned is a continuous-control tracking activity.

Procedures Trainers, Part-Task Trainers

Procedures trainers and part-task trainers are appropriate for perceptual-motor acts which are weighted more heavily toward procedural components than towards continuous-control components.

TO PERFORM PROCEDURAL SEQUENCES

Procedures Trainers

Procedures trainers and part-task trainers, as the names imply, are training aids designed specifically for this training objective and consequently should be quite effective.

Simulators

Simulators can be as effective for this training objective as procedures trainers. However, considerations of cost and economy of student and instructor time frequently dictate the use of procedures trainers for learning subtask procedural performances.

Training Films

Training films can be quite effective in teaching procedural sequences if the trainee is given the opportunity for step-by-step practice of the desired responses as they are being presented on the screen.

TO MAKE DISCRIMINATIONS

Training Films

Training films can be used in teaching perceptual discriminations if most of the required cues are visual. For most effective use, the training film should present pictures of the actual equipment operating within a realistic environment with the opportunity for practicing the discriminations built-in.

Simulators

Simulators are appropriate for teaching perceptual discriminations if all requisite cues can be presented within the simulator. Be sure to include all the important cues, however, because some of the cues underlying certain discriminations may, on the surface, appear unimportant.

Transparencies

Transparencies are appropriate for this training objective if they are realistic photographs of a situation and include the major identifiable visual cues underlying such discriminations.

TO LEARN CONCEPTS, PRINCIPLES AND RELATIONSHIPS

Television, Simulators, Animated Panels, Training Films, Operating Mock-ups

All training aids and devices which have the capability of presenting or illustrating motion characteristics are quite useful for the teaching of functional relationships between concepts, principles and operating parts of machinery, etc. This is the training objective most frequently encountered in vocational and technical training.

Transparencies, Charts, Teaching Machines, Procedures Trainers, Non-Operating Mock-ups

All of these training aids can be used to illustrate principles and functional relationships of equipment operation if structured in terms of this objective.

PROBLEM SOLVING AND TROUBLE-SHOOTING

Teaching Machines

Teaching machines appear most appropriate for this objective if they are programmed so that the problem is presented in conjunction with all required information underlying proper decisions. The trainee then may practice arriving at appropriate decisions. For each decision selected, the trainee may receive immediate feedback as to the adequacy of his decision and reasons why it might not have been the preferred decision.

Training Films

Training films can be effective for this objective if they present problem areas requiring decisions within a realistic operational context.

Simulators

Simulators, particularly those classed as full system simulators that incorporate complete system capability, are appropriate for training in decision-making and trouble-shooting responses.

Actual Equipment

Although actual operating equipment such as radios or engines can be used, they are often not as effective as simulators because of the difficulty in inducing and controlling realistic malfunctions.

Almost without exception, every unit of instruction will need the support of training aids, devices and visuals of some sort. Training equipment has considerable influence on both the effectiveness and the cost of the training program; so it is very important to make sure the selected training aids and devices can be fully justified. Remember, the least costly medium, or mix of media, that can adequately support the training objective is probably the best choice. This appendix has given the designer some guidelines that will help him to arrive at the right decision. But, because so many factors both known and unknown enter into any cost-effectiveness analysis, the selection of media remains essentially an educated guess.

OCCUPATIONAL COUNSELING

Occupational Counseling can be a useful tool in assisting Job Corps students in setting goals, developing plans to assist them in meeting these goals and to monitor the students progress in meeting these goals.

Before an enrolee can make a choice of which occupational training course he should persue he must be made aware of the following information.

- All the Occupational Training Programs offered at a Center
- The skill levels required for completion of each Occupational Training Program
- Placement procedure for entry into an Occupational Training Program
- Content of the Occupational Training Program and how the material is to be taught
- The beginning wages, fringe benefits and promotional opportunities
- The Job Physical Profile (what the physical demands of the job are)
- The Attitudes and Professional Ethics required of the job
- The Education and Technical Knowledge required to obtain the job
- The probable employment opportunities in a specific occupation
- Career opportunities that the job may ultimately lead to

Also, students should be made aware of their personal qualities such as, abilities, skills, past experience, past education, interests, etc. These qualities can be pointed out to the student in counseling sessions. Testing can be used to determine some of these factors, as well. Encouraging students to express their feelings while experiencing occupational orientation or in the early stages of training will provide much of this useful information.

Essentially, the counseling sessions give the instructor and the trainee the best opportunity to determine what the problems are, and how best to arrive at a solution in dealing with each problem. Trainees are often frightened and confused at first in any training program and are reluctant to express themselves. Using proper counseling techniques, the instructor can gain much insight to the students problems when counseling is done on a one-to-one basis.

Misconceptions and mis-understandings of occupations should be cleared up early in a students training. The use of counseling sessions, as often as possible, early in the students training, will make the instructors task much easier in the long run.

OFF-SITE CONTRACT TRAINING

Many Centers use contract occupational training for a variety of reasons. Some prefer this because the expertise and materials can be provided by a contractor more economically. Some training programs require elaborate clinical, laboratory or shop facilities, equipment and technical instructors that cannot be made available at a Center. In some states, and for some occupations, there are stringent legal requirements and licenses for training which either are difficult to obtain or too difficult to manage on site. At times, only a few trainees desire or are qualified for a particular training program. Also, other local government agencies may already be providing occupational training and will cooperate with the Center by admitting trainees. In any event, there are usually many different reasons a Center chooses to use off-site contract training.

The Occupational Training Guides and Training Achievement Records should be used as criterion to evaluate the scope and content of contractural training programs. Contracted training programs may vary considerably; some may be flexible enough to make or provide variations when requested to do so; others have well-organized and comprehensive programs which will encompass all training elements; some may develop a curriculum from the Guide. Whatever the situation may be, the Occupational Training Guide is the Center's tool for establishing criteria.

The Guides were designed to meet national, minimum job entry-level training criteria and should be supplemented with local requirements if necessary.

Additional training elements should be agreed upon when contracting training and noted on the OTG and TAR along with the levels of performance required. The contractor must be willing to provide opportunities to bring the students up to the required levels of performance.

Once the student is placed in training, the Center can then monitor progress of the student through the use of the TAR. Prearranged intervals for evaluation are necessary to achieve a stable system of tracking. The TAR keeps the student informed of his progress in training.

Both the OTG and the TAR can serve as useful documents for Center Staff to be assured that:

1. Contracted off-site training is comprehensive enough to provide for the employability of the enrollee.
2. The contractor is knowledgeable of the student's needs.
3. The students are aware of training requirements and the progress he or she is making.
4. Good quality control over all occupational training is maintained.
5. Each student's training status is being monitored.
6. Curriculum criteria for evaluating contractual training is available.
7. Prospective employers have specific knowledge of the training content and the student's performance capability.

WORK EXPERIENCE PROGRAMS

Work experience causes an enrollee to develop skills which are an integral part of the occupational training program and should be encouraged. Such an experience can enhance the trainee's feeling of responsibility and self-esteem as well as increase his proficiency. It can give students actual work setting experience where they learn regular work standards, thereby assisting them toward employment.

There are qualities of the "real" work experience which cannot be simulated at a Training Center. Some of these qualities are directly related to skill development: speed, adaptability, routine; others to specific job needs: routing of forms and numbering systems; and others add to the personal growth and sophistication of the student.

Essential to the work experience program is that the students perform tasks which are within the scope of the Occupational Training Guides and for which they have received prerequisite training. Whether this phase of the program is conducted off or on Center. A primary consideration is to provide experience that will develop essential skills that will be used on the job.

The selection of work experience settings should be handled with the same degree of care as that given to the entire training program. Every student should have the opportunity for this type of training. It is, therefore, imperative that work experience sites be selected where there is good supervision of students and where the tasks given to the students are meaningful and appropriate.

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The occupational trainer and the work-experience supervisor should have the ability to communicate with the trainee. The work experience must be a planned experience with an agreement on the part of all participants as to what is expected of the trainee. Off-Center work experience arrangements should also include an orientation program to advise those participating as to what the program goals are.

The Occupational Training Guide is an excellent document to use when designing the work experience program. Specific training elements and proficiency levels should be discussed with the participants in a work experience program and specific tasks should be selected for student learning. The attitude and Professional Ethics levels of proficiency are very important matters to be discussed as well because of their similarity and proximity to actual employment.

As the work experience program progresses, quality control can be achieved through using the Training Achievement Record. The student's accomplishments can be monitored by using the TAR record keeping document. The student should be encouraged to go beyond the minimum performance level requirements of the OTG especially in a work experience setting that is rich with motivational stimulation.

Upon completion of the entire training program, the Training Achievement Record containing the work-experience component can then be forwarded to potential employers. The information contained in the TAR will furnish employers valid information as to the student's breadth and depth of training as well as the student's achievements. Work experience will be especially interesting to the employer as it can be related directly to actual working condictions.

STAFF TRAINING

Many potentially successful training programs fail because the instructional and management staff lack the expertise in conducting the program. Many instructors, though knowledgable in a specific skill, cannot disseminate the instructional material in an interesting and objective manner.

To build quality in any training program, strong emphasis must be placed on teacher and instructor remedial training. In this day of rapidly changing technology, it is vital that all instructional staff be made aware of the best techniques in conducting their training programs. Remedial education programs for Training Center Staff should strongly be considered if a quality program is to be offered at a Center.

Staff training is not a simple operation. Often it is oversimplified with resulting disappointments. In order for staff training to be effective, the goals and objectives must be clearly defined. Some of these goals to be achieved are:

- To teach new basic skills or techniques
- To remediate skills
- To change procedures or programs
- To create motivation
- To stimulate creative ideas
- To orient new staff members
- To establish communication patterns
- To focus on solving problems

- To reinforce learning
- To evaluate programming and procedures
- To exchange knowledge between professionsl disciplines
- To reorganize training systems

Once the goals and objectives are agreed upon there are other factors to be considered. They are: (a) the number of people to be trained, (b) their job roles and responsibilities, (c) their job skills, (d) time allotted for training, (e) place, (f) trainee's compensation, (g) distractions, (h) delegation of responsibilities while in training, (i) personal commitment and (j) management commitment to name a few of the most important factors.

Staff training programs must follow the same principles of any good training program. These procedures are threefold: the first part consists of the presentation and learning segment. After the staff has had an opportunity to "try it on for size," the trainees should be assembled to help them work through the implementation. The second step should occur no longer than three months after initial training. Within six months, the original group should be reassembled to assess the progress and draw plans for developing and continuing the process and therefore, staff training should follow the process of (1) presentation/learning, (2) implementation and (3) analysis/planning.

Careful consideration must be given to priorities of needs in developing a staff training program. Here, careful research and outside consultation would be most helpful. Ideally, a plan should be developed with each Center before any staff training takes place.

AUTOMOTIVE MECHANIC'S HELPER

TRAINING ELEMENTS	Level
Safety	
1. Use proper protective clothing and safety precautions when using caustic cleaning agents	4d
2. Use proper safety precautions when using tools, lifting cars, engines, etc. with jacks and lifts	4d
3. Use safety precautions in servicing overheated cooling systems	4d
4. Use safety precautions in handling batteries and battery acid	4d
5. Maintain and clean work area to keep free from oil and grease	4d
6. Insure adequate ventilation when testing engines inside building	4d
General	
7. Use and maintain common and special hand tools	3c
8. Use and maintain standard and special measuring instruments and gauges	3c
9. Interpret and use repair manuals and parts catalogs	2b
Electrical Systems	
10. Read and interpret wiring diagrams	2b
11. Troubleshoot and repair faulty circuitry	3c
12. Service and install battery	3c
13. Check, repair and service starter motor	3c
14. Check, repair and service generator and/or alternator	3c
15. Check, repair and service ignition system	3c
Fuel-Air Systems	
16. Check, repair and service carburetor	3c
17. Check, repair and service fuel pump	3c
18. Check, repair and service pollution control system	3c
19. Check, repair and service exhaust systems	3c
Cooling System	
20. Check, service and repair radiator	3c

Supersedes Training Standard 440.81 dated Aug 60, Oct 72

AUTOMOTIVE MECHANIC'S HELPER cont.

TRAINING ELEMENTS	Level
21. Check, service and repair water pump	3c
22. Check, service and repair thermostat, hoses and fan belts	3c
Engine	
23. Disassemble and inspect engine for wear and damage	2b
24. Use measuring devices to check for wear of crankshaft, pistons, cylinder walls, etc.	2b
25. Grind, replace valves, valve seats and valve guides	3c
26. Replace camshaft bearings	3c
27. Bore and hone cylinders	2b
28. Fit piston pins, pistons and connecting rods	3c
29. Fit main bearings and connecting rod bearings	3c
30. Systematically assemble engine parts and install engine accessories	3c
31. Install new or reconditioned engine into vehicle	3c
Drive Train	
32. Remove, repair and install clutch	3c
33. Remove, repair and install standard transmission	3c
34. Remove, repair and install automatic transmission	3c
35. Remove, repair and install universal joints and propeller shaft	3c
36. Remove, repair and install rear axle assembly	3c
Brakes and Front End	
37. Remove, repair and install brakes	3c
38. Remove, repair and install steering units and linkages	3c
39. Remove, repair and install springs, shock absorbers and wheel bearings	3c
ADDITIONAL RELATED TRAINING ELEMENTS	

AUTOMOTIVE MECHANIC'S HELPER cont.

EDUCATION AND TECHNICAL KNOWLEDGE	Level
1. Carry out detailed but uninvolved written or oral instructions	3b
2. Deal with problems defining a few specific tasks of standard practices	3b
3. Use arithmetic to add, subtract, multiply and divide whole numbers	3b
4. Read, write and speak, using complex sentences	3b

JOB PHYSICAL PROFILE	
1. Able to lift 100 lbs. maximum; carry objects up to 50 lbs.; walk or stand most of the day	4
2. Able to use back muscles and legs to stoop, kneel, crouch and crawl	4
3. Able to use fingers, hands and arms to reach, handle and feel	4
4. Work indoors, protected from weather conditions	4
5. Work in contact with wet or humid conditions	4

AUTOMOTIVE MECHANIC'S HELPER cont.

ATTITUDES AND PROFESSIONAL ETHICS	Level
1. Demonstrate correct safety practices on the job	IV
2. Maintain appropriate personal hygiene and appearance	II
3. Arrive on the job on time	III
4. Is on the job every day	III
5. Perform work of consistently good quality	IV
6. Function cooperatively with fellow workers	III
7. Treat others courteously	III
8. Work with even temperament	III
9. Accept constructive criticism	III
10. Follow instructions willingly	IV
11. Deal well with supervision	IV
12. Willingly work unusual schedules when required	III
13. Handle proprietary information discreetly; respect confidences	III
14. Respect worth of equipment, company and personal property	IV

COURSE TRAINING (ANALYSIS) PLAN

The Course Training (Analysis) Plan should be prepared for all training programs offered on Center. The CTP identifies the course of training, project units of instruction and objectives of training. The CTP specifically describes each trainee activity or task necessary to accomplish the objectives of training. The CTP correlates each Training Element of the specific Occupational Training Guide with each trainee activity or task. This is necessary to assure each trainee of having the opportunity of receiving the same quality and subject matter. The CTP identifies all tools, equipment, training aids and materials associated with each trainee task. The attached example is only a portion of a training program, the example includes Occupational Exploration and Basic Skills for an automotive mechanic. This example illustrates the blending of the OEP and Basic Skills in the training curriculum. It is expected that the Work Experience program could be blended in with the training curriculum in the same manner. The value of this training document (CTP) will be the pivot point of utilization by all Center Staff to support occupational training as well as providing a tool for all levels of management support.

TRAINEE ACTIVITY AND TASK

The trainee activity and/or task can be designed for utilization of any instructional media such as audio, visual, motion or still presentation, written, instruction by other trainees, etc. However, in either case, the task or activity should be designed to allow each trainee the same opportunity for performance and evaluation. The other important quality of the activity should be to individualize and self-pace the instruction as far as the Center and Staff have the capability to accomplish. Two written examples of written tasks have been designed to fully explain this intent, utilizing the written format. The examples have been successfully used by training Centers. The examples are specifically designed to guide the trainee in accomplishing tasks:

> 3-A-2, to service, install and test battery, specific gravity, and explain the operation and record specific gravity readings.
>
> 3-B-2, to remove and install ignition points and condensers.

Many tasks of the same quality for most occupational areas have been developed by professional and trade associations or representatives, which if properly researched and analyzed could save the Center Staff development time and cost.

The important point is not how curriculum is developed or acquired, but that curriculum (task lists) are essential for Occupational Training and support from all staff and management to the training curriculum.

COURSE TRAINING (ANALYSIS) PLAN	TRAINING PROGRAM DOT CODE DATE Automotive Mechanic 620.884	CENTER	Page 1 of 20
COURSE/PROJECT UNIT OF INSTRUCTION AND OBJECTIVES	TRAINEE ACTIVITY AND TASKS	OTG ELEMENTS	TOOLS, EQUIPMENT, TRAINING AIDS & MATERIALS
Unit of Instruction 1. Occupational Orientation and Exploration			
Training Objective A. Identify simple tasks and state simple terms pertaining to each training element; remove and replace components.	Activity/Task 1-A-1 Observe audiovisual presentation which illustrates each training element of OTG 440.81, dated October, 1972.	All Training Elements	OEP Handbook 35mm Slide Projector Tape Recorder OEP Slides
	1-A-2 Tour automotive training area/shop, discuss any task observed; perform simple task of wheel cylinder removal and replacement.	2,7,9,37	Mechanics Tool Box Automotive Steering System Trainer Wheel Cylinder Kit
B. Express desire of accepting or rejecting the automotive course or a training program.	1-B-1 Discuss responses in OEP Handbook with Vocational Counselor to acquire more information and make decision or automotive training.	All Training Elements	OEP Handbook Occupational Selection Form
2. Basic skills, tools, equipment and hardware			
A. Identify, use mechanic's common hand tools and apply proper safety precautions in their use.	2-A-1 Identify all common hand tools and relate each to a task. Use each tool or a corresponding or simulated task; apply proper safety practices.	2,7	1 Teaching Machine 1 Basic Skills Orientation Kit 15 Basic Skills Kits Tools, Cassette Tapes, Film Strips

Figure 0

COURSE TRAINING (ANALYSIS) PLAN	TRAINING PROGRAM DOT CODE DATE Automotive Mechanic 620.884	CENTER	Page 2 of 20
COURSE/PROJECT UNIT OF INSTRUCTION AND OBJECTIVES	TRAINEE ACTIVITY AND TASKS	OTG ELEMENTS	TOOLS, EQUIPMENT, TRAINING AIDS & MATERIALS
			15 Trainee Workbooks 15 End of Kit Tests
	2-A-2 Identify all common measuring tools and relate each to a task. Use each measuring tool on a corresponding or simulated task; apply proper safety practices.	2,8	1 Teaching Machine 2 Basic Skills Measurement Kits, Cassette Tapes, Film Strips 2 Trainee Workbooks 2 End of Kit Tests
	2-A-3 Identify simple automotive tune-up tools and relate each to a task. Use each tune-up tool on an actual automobile part.	2,8,9	1 Teaching Machine 6 Automotive Kits, Cassette Tapes, Film Strips 6 Trainee Workbooks 6 End of Kit Tests Automotive Engine
3. Automotive Electrical System A. Disassemble, assemble, check and repair automotive starting system components; use automotive repair manual and activity/task sheets.	3-A-1 Use electrical terms and simple circuit diagrams. Explain how the battery provides electricity for the automobile electrical system and connect circuits on the mock-up.	2,8,9,10,11	Electrical System Mock-up 6V Automobile Battery 12V Automobile Battery Automobile Parts Manual Engine Wiring Diagrams
	3-A-2 Service, install and test battery, specific gravity; explain the operation and record specific gravity readings.	1,2,4,8,9.10, 12	Battery Tools Cable Clamp Puller Battery Terminal Cleaner Water Container & Syringe 6V Automobile Battery

COURSE TRAINING (ANALYSIS) PLAN	TRAINING PROGRAM DOT CODE DATE Automotive Mechanic 620.884	CENTER	Page 3 of 20
COURSE/PROJECT UNIT OF INSTRUCTION AND OBJECTIVES	TRAINEE ACTIVITY AND TASKS	OTG ELEMENTS	TOOLS, EQUIPMENT, TRAINING AIDS & MATERIALS
			12V Automobile Battery Battery Hydrometer Maintenance Record
	3-A-3 Perform battery leakage, battery capacity, battery 3-minute change and individual cell tests; record the readings and explain the operation.	1,2,4,8,9,10,12	12V Automobile Battery Battery Starter Tester (Sun Model BST-11) Battery Charger (Sun Model 160) Battery Cell Prober (Sun Model BCP) Battery Tester (Sun Model BT-421)
	3-A-4 Remove, replace, check and install 6V and 12V starter motors, starter switches and starter solenoids; record and explain tester readings.	2,7,8,9,10,12	Automobile 6V System Automobile 12V System Mechanic's Hand Tools Battery Starter Tester (Sun Model BS-11)
B. Disassemble, assemble, check, repair, adjust and replace faulty automotive ignition system components; use Automotive Repair Manual and Task/Activity Sheets.	3-B-1 Visually inspect a distribution and make the following tests; explain the test in electrical terms. a. Condenser Test b. Resistance Test c. Breaker Plate & Point Tension Test d. Centrifugal Advance Test e. Vacuum Diaphragm Test f. Spark & Vacuum Advance Test g. Dwell Test	2,7,8,9,10,11,15	Automotive Distributor Distributor Tester (Sun Model DT 504)

COURSE TRAINING (ANALYSIS) PLAN	TRAINING PROGRAM DOT CODE DATE Automotive Mechanic 620.884	CENTER	Page 4 of 20
COURSE/PROJECT UNIT OF INSTRUCTION AND OBJECTIVES	TRAINEE ACTIVITY AND TASKS	OTG ELEMENTS	TOOLS, EQUIPMENT, TRAINING AIDS & MATERIALS
	3-B-2 Remove and install ignition points and condensers.	2,7,8,9,10, 11,15	Automotive Distributor Points & Condenser Kit Ignition Tools Maintenance Record
	3-B-3 Test, check and replace condensers, coils, wiring harnesses and spark plugs.	2,7,8,9,10, 11,15	Spark Plug Tools Spark Plug Tester Spare Parts
C. Disassemble, assemble, check, repair, adjust and replace faulty automotive charging system components; use Automotive Repair Manual and Task/Activity Sheets.	3-C-1 Remove, disassemble, inspect, clean, replace parts, reassemble and replace DC Generator; describe activity.	2,7,8,9,10, 11,14	Automobile Engine Mechanic's Hand Tools Spare Parts Armature Tester (Sun Model AT-76)
	3-C-2 Remove, disassemble, inspect, clean, replace parts, reassemble and replace alternator; describe activity.	2,7,8,9,10, 11,14	Automobile Engine Mechanic's Hand Tools Spare Parts Ignition Tools
	3-C-3 Test generators, alternators, charging circuits and voltage regulators and record readings.	2,7,8,9,10, 11,14	Automobile Engines with Generators and Alternators Volt-Ampere Tester (Sun Model VAT-20) Alternator Tester (Sun Model GAT-620) Battery Post Adaptor (Sun Model BPA)
D. Demonstrate proficiency by performing a random-selected task from each of the task/activities listed in the TRAINEE	3-D-1 Perform each task as required to the proficiency code level. Items 9 and 10, Level 2b; all other items, Level 3c.	2,7,8,11	Tools, Equipment, Training Aids, Materials, Etc. Will be selected to coincide with the selected tasks.

COURSE TRAINING (ANALYSIS) PLAN	TRAINING PROGRAM DOT CODE DATE Automotive Mechanic 620.884	CENTER	Page 5 of 20
COURSE/PROJECT UNIT OF INSTRUCTION AND OBJECTIVES	TRAINEE ACTIVITY AND TASKS	OTG ELEMENTS	TOOLS, EQUIPMENT, TRAINING AIDS & MATERIALS
ACTIVITY AND TASK column of this Training (Analysis) Plan, not including Training Element # 37. If proficiency for items 1, 2,4,7,8,9, & 10 are obtained, the Counseling Remarks Section will reflect that this proficiency only relates to items 11, 12, 13, 14, 15.			

TRAINEE ACTIVITY AND TASK

PROGRAM AUTOMOTIVE MECHANIC'S HELPER D.O.T. CODE 620.884

UNIT OF INSTRUCTION Automotive Electrical System

O T G TRAINING ELEMENTS 2,7,8,9,10,11,15 TASK NO. 3-B-2

SERVICING DISTRIBUTOR

- Here's what you will need:
  1. Information in this Task Sheet.
  2. Ignition tools (Use your own or get them from your instructor).

In this Task Sheet you'll learn the correct procedures to install points and condensers.

- Here's what you do:
  1. Read and study this Task Sheet before you install points and condensers.
  2. Install points and condensers as outlined in this Task Sheet.

- Here's how well you must do this Task before you can move up the next Task Sheet:

  You must install points and condensers on at least four different cars and show your instructor your finished job. When he approves of your job, you are ready to go on to the next Task Sheet.

IT ALL STARTS HERE

Each car electrical unit, from starter motor to spark plug to tail light gets its power from the battery. But before we go any farther, let's talk about safety.

SAFETY HINT

Always wear safety glasses when servicing automobile batteries. Here's why: Battery acid will burn and can ruin you eyes if it gets in them. Even the dry chunks of dirt and corrosion from a battery can hurt if they're brushed or blown into your eyes. Safety glasses help to protect your eyes, but if battery acid does splash into your eyes, wash out your eyes with cold water and then tell your instructor what happened. If battery acid gets on your skin or clothing, wash it off with plenty of cold water right away.

Your instructor will show you how to clean up spilled battery acid on customer cars. If battery acid gets on an automtobile's finish, it will discolor and stain paint and chrome. Use plenty of cold water to rinse off the spilled acid.

While an automobile battery is being charged it gives off an explosive gas. Never light a match or have a flame near a battery. Never service a battery while it is being charged. A flame or spark can make the gas explode, blowing up the battery case and splashing acid all over you. Your instructor will give you special instructions on how to keep from making sparks near batteries.

Even when a car's battery isn't being used, the battery is losing some of its charge and service life. This loss is caused by the chemical action inside each cell. New batteries are usually dependable, but an older battery may have lost enough of its service life so that even constant battery charging won't help.

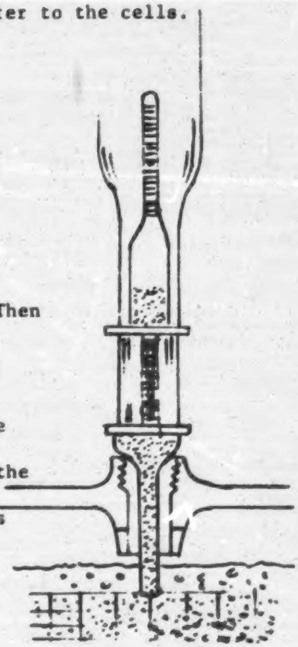
Since the battery supplies all the power to start the engine, a tune-up mechanic needs to know how good the battery is. You can make a simple test using a $2.00 battery hydrometer and find out a lot about the battery. The hydrometer is used to test the specific gravity or weight of the electrolyte. The weight of the electrolyte tells the state of charge.

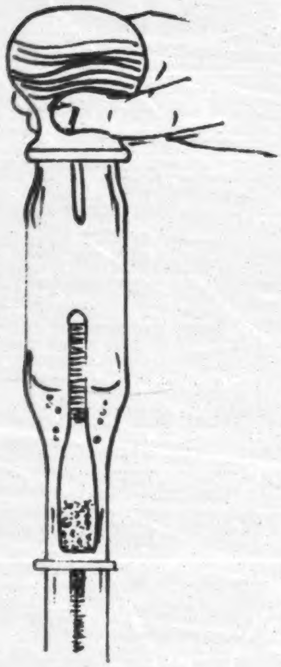
TUNE-UP HINT

If water has just been added to the battery, the hydrometer reading won't be accurate. Take your hydrometer readings before adding water to the cells.

Here's how to test spcific gravity:

1. Get your safety glasses and put them on. Then remove the vent plugs from each cell.
2. Take the battery hydrometer and squeeze the rubber bulb at the top. Poke the tube at the other end into an end cell until it touches the top of the plates as shown in this picture.





3. Release the rubber bulb slowly. Draw electrolyte up into the hydrometer until the float rides as shown in this picture.

4. Lift the hydrometer away from the battery. Be careful not to drip electrolyte on yourself or the customer's car.

5. Hold the hydrometer straight up and down. The float must ride free in the electrolyte. Read the scale where the top surface of the electrolyte touches the float and write the reading on a piece of scratch paper.

TUNE-UP HINT

Your instructor will show you how to use the temperature correction chart on page

6. Return the electrolyte to the same cell it came from. Poke the tube of the hydrometer back into the cell but not down all the way. Then squeeze the rubber bulb and squirt the electrolyte back into the cell.
7. When the electrolyte is returned to the cell it came from, slowly lift the hydrometer. As the tube clears the electrolyte, release the rubber bulb and then pull the hydrometer all the way out.

8. Now repeat steps 2 through 7 on the next cell. Be sure to wear your safety glasses and don't squirt or splash the electrolyte outside the battery cell.

9. When you've recorded the readings of all the cells of the battery, replace the vent plugs. Rinse the hydrometer in clean water a few times and then return to its proper storage.

Here's how you interpret the hydrometer test:

1. If the specific gravity of one cell is 1.260 or above, that cell is 100% charged.

2. If the specific gravity of one cell is between 1.230 and 1.250, that cell is 75% charged.

3. If the specific gravity of one cell is between 1.200 and 1.220, that cell is 50% charged.

4. If the specific gravity of one cell is between 1.170 and 1.190, that cell is 25% charged.

5. If the specific gravity of one cell is 1.160 or below, that cell is discharged.

6. If the difference between the highest and lowest cell is .050 (50points) or more, the battery has lost most of its service life and should be replaced.

7. Get your instructor and show him the results of your test. He may want to charge the battery and then test it again.

Here are a few questions to find out if you know how to test battery specific gravity.

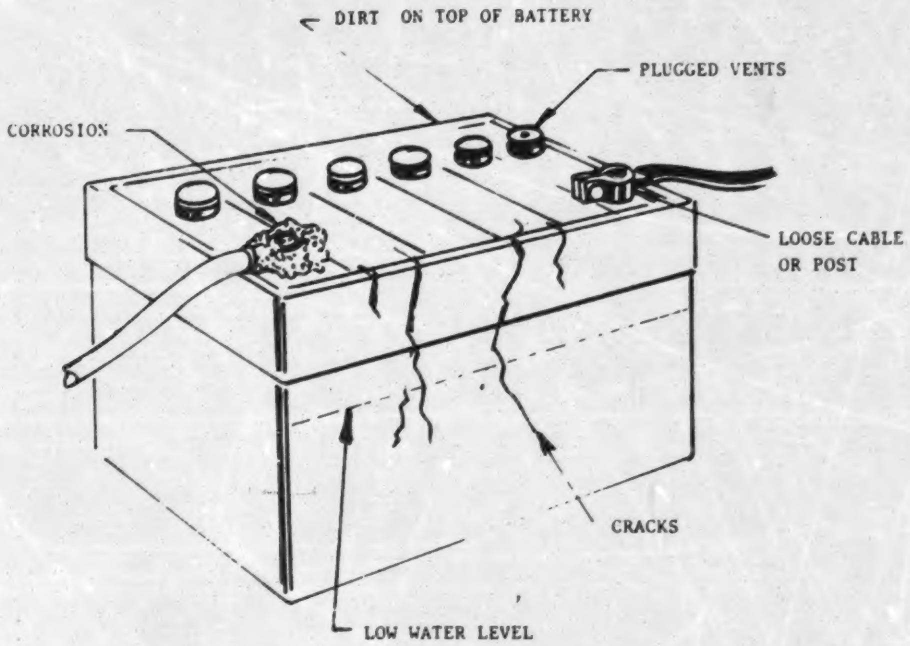
Answer each question and underline the correct words.

1. A battery loses some of its charge and service life even when it isn't being used.
   true/false
2. All the power to start an engine is supplied by the alternator/battery.
3. If the specific gravity of one cell is 1.260, that cell is 100% charged/ discharged.
4. If the specific gravity of one cell is 1.240, that cell is 25%/75% charged.
5. If the specific gravity of one cell is 1.210, that cell is 50%/75% charged.
6. If the specific gravity of one cell is 1.160, that cell is 25% charged/ discharged.
7. If the difference betweeen the highest and lowest cell is .075(75points), that battery should be recharged/replaced.
8. A specific gravity reading of 1.250 is taken at 10°F. The true reading is 1.222/1.278.
9. A specific gravity reading of 1.220 is taken at 120°F. The true reading is 1.204/1.236.
10. When returning the battery hydrometer to its proper storage, rinse the hydrometer in battery acid/clean water.

SUCCESS CRITERIA:

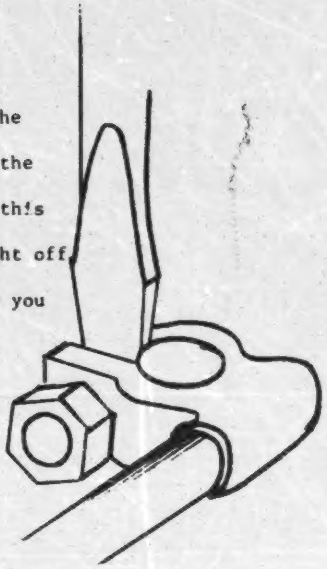
Show this page to your instructor. He will grade each question and mark the mistakes. If you made a mistake, check the question. Locate the correct answer in this Task Sheet and then show this page to your instructor again. When your instructor approves your specific gravity readings and this test, you are ready to go on to the next Task Sheet.

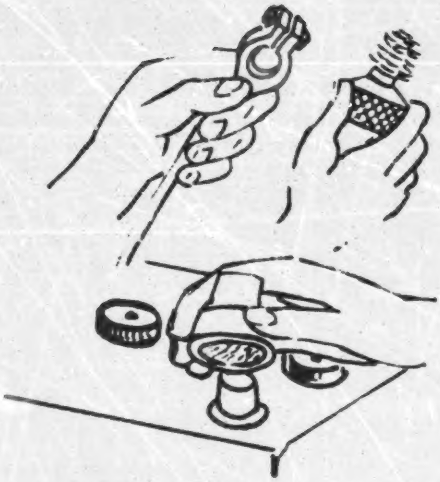
The first step in servicing an automob[illegible] battery is to look at it and check the things shown in this picture and listed below:



1. Check the battery case for cracks and leaks. Wiggle the cable clamps and battery posts. If the battery case is cracked or if the battery posts are loose, STOP, get your instructor and he will decide what to do with this battery.
2. Check the battery posts, clamps, and cables for corrosion. Also notice if the top of the battery is clean and dry. If any part of the battery is corroded, wet, or dirty, go to step 3.

3. Remove both battery cable clamps. Loosen the bolt with a box end wrench and then spread the clamp with a large screwdriver as shown in this picture. If the cable clamp won't lift right off, STOP, get your instructor and have him show you how to use a puller to remove the cable clamps.

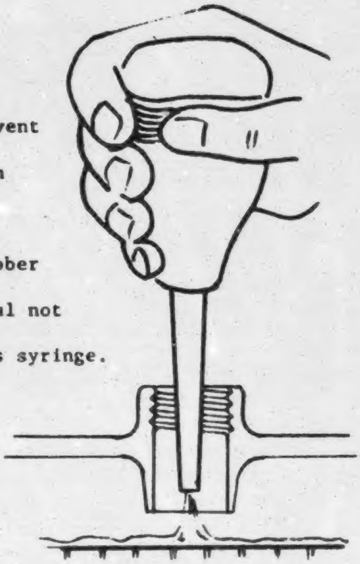




4. Use a battery post and cable clamp cleaner to clean both posts and clamps as shown in this picture.

5. Pull your safety glasses down in front of your eyes and then brush away the dirt and corrosion. Get your instructor to show you how to neutralize the battery top.

6. Pick up each cable clamp and wiggle the cable. If the clamps are cracked or if many of the small wires in the cable are broken, STOP, get your instructor and he will decide what to do next.



7. Remove the vent plugs and be sure each cell vent is open. Check the electrolyte level in each cell and add distilled water if necessary to bring the level up to the mark. Hold the rubber syringe as shown in this picture. Be careful not to draw electrolyte out of the cell with this syringe.

TUNE-UP HINT

If the electrolyte level was real low in any of the cells, or if the battery needs to be charged or tested, tell your instructor and he will decide what to do next.

8. If the battery needs to be removed from the car. loosen the hold down bolts, and carefully lift the battery with a carrying strap. Don't rub the battery against your clothes. Remember: battery acid burns!

9. If the battery is OK and the top is clean and dry and the posts and cable clamps are clean, replace the cable clamps onto the correct battery post. Remember "+" means positive and "-" negative. Most 12 volt cars have negative grounds but you should check to be sure. The positive post is usually marked "+" or "POS" and is larger than the negative post.

10. Tighten each cable clamp bolt and then smear some non-metallic petroleum jelly over each post and clamp. Check the battery hold down for correct tightness.

SUCCESS CRITERIA

Here are a few questions that will tell if you're ready to go on. Answer each question and underline the correct words.

1. Each car electrical unit gets its power from the battery/generator.
2. When servicing automobile batteries always wear gloves/safety glasses.
3. If battery acid gets in your eyes, wash out your eyes with antiseptic/cold water.
4. An automobile battery gives off an explosive gas while it is being charged/discharged.
5. To remove a cable clamp form the battery post, first loosen the bolt with a box end wrench/large screwdriver.
6. If the cable clamp won't lift right off, even after you've loosened it, use a large crowbar/get your instructor.
7. To clean the battery posts and cable clamps, use a dry rag/post and cable clamp cleaner.
8. If it's necessary to bring the electrolyte level up to the mark, add only battery acid/distilled water.
9. The rubber syringe is used to add distilled water/electrolyte to the battery cells.
10. The positive post is usually marked "+" or "POS" and is larger/smaller than the negative post.

Show this page to your instructor. He will grade each question and mark the mistakes. If you made a mistake, check the question. Locate the correct answer in this Task Sheet and then show this page to your instructor again. When your instructor approves your battery service job and this page, you are ready to go on to the next Task Sheet.

TRAINEE ACTIVITY AND TASK

PROGRAM AUTOMOTIVE MECHANIC'S HELPER D.O.T. CODE 620.884

UNIT OF INSTRUCTION Automotive Electrical System

O T G TRAINING ELEMENTS 2, 8, 9, 10, 12 TASK NO. 3-A-2

SERVICING, INSTALLING AND TESTING BATTERY SPECIFIC GRAVITY

- Here's what you will need:

  1. Information in this Task Sheet
  2. Battery tools, cable clamp puller, battery terminal cleaner, battery water container with syringe.
  3. Batteries

THIS TASK SHEET WILL SHOW YOU HOW TO CHECK AND QUICK-SERVICE AN AUTOMOBILE BATTERY.

- Here's what you do:

  1. Read the information in this Task Sheet.
  2. Service a battery as outlined in this Task Sheet
  3. Test the battery specific gravity as outlined in this Task Sheet.

- Here's how well you must do this Task before you can move up to the next Task Sheet:

  Your instructor must approve your battery service and testing job.

Figure R

DISTRIBUTORS

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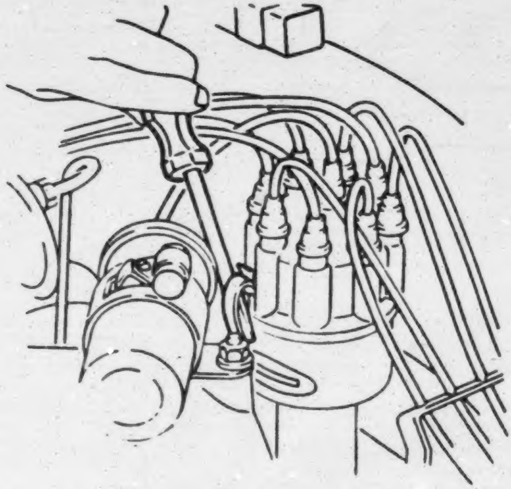
The following contains tips on servicing the ignition distributor.

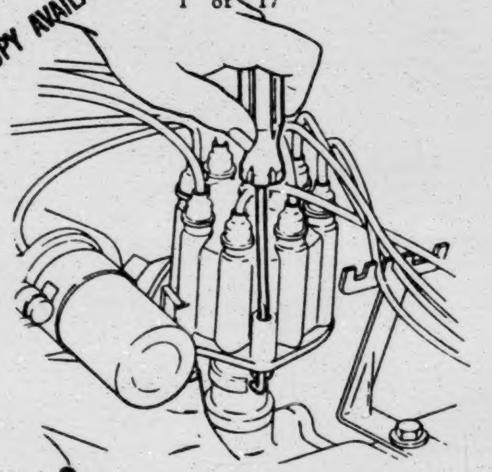
The component parts of the distributor covered are the cap, rotor, points, and condenser.

PROCEDURE FOR REMOVING, INSPECTING AND INSTALLING DISTRIBUTOR CAPS:

1

To remove the cap from a distributor containing spring clips, place a screwdriver between the spring clip and distributor housing and pry outward. Do not apply screwdriver pressure to the cap itself as this might crack the cap.



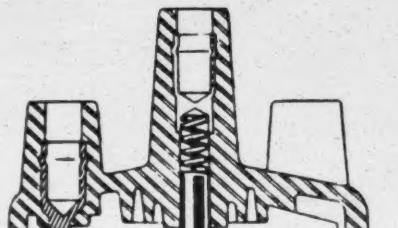


2

To remove the cap from a distributor containing spring-loaded screw clamps, press down on the screw and turn in either direction to release clamp from the distributor housing so cap can be removed.

3

Inspect caps having a spring-loaded rotor button for freeness of movement of the button. Excessive wear of the button should also be noted, and the cap replaced, if necessary, as discussed in later pages.



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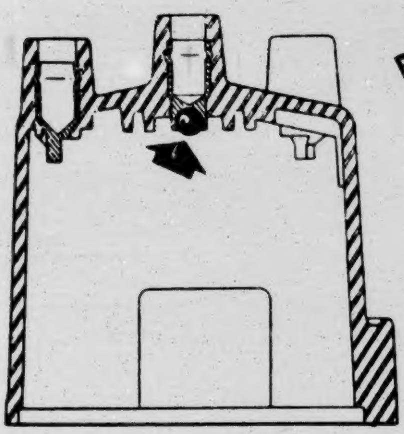
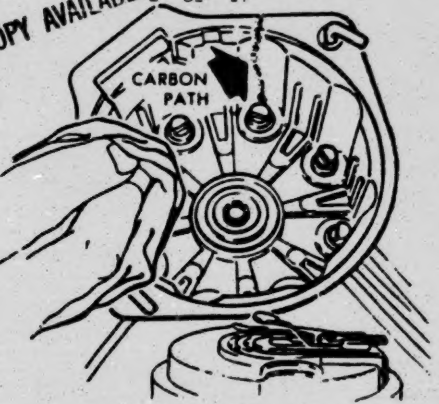


4

Caps having a solid rotor button should be examined for excessive wear of the button, chips or cracks. If these defects are found, replace cap as discussed in later pages.

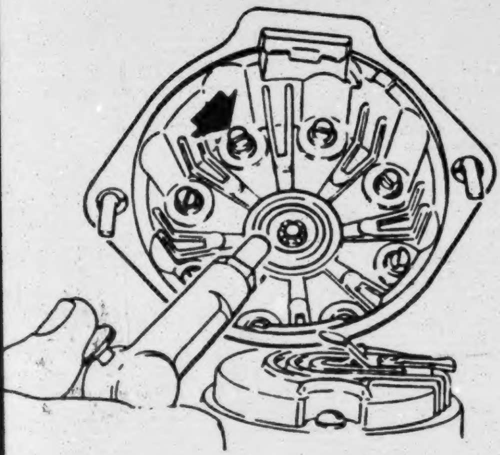


5

Wipe the inside of distributor cap with a clean cloth dampened in solvent and inspect cap for carbonized paths, which will allow high tension leakage to ground, and for chips and cracks.

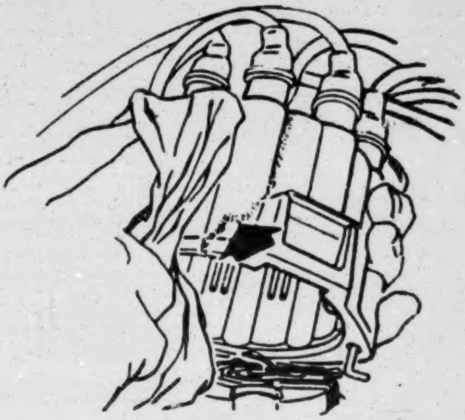
6

Dry inside of cap with an air hose. Check for badly burned or eroded inserts and replace cap if necessary. Corroded inserts should be scraped clean to maintain a low resistance path for current flow.



7

Clean exterior of cap with a clean rag and solvent. Check for chips, cracks and carbonized paths. Such defects indicate the need for cap replacement.



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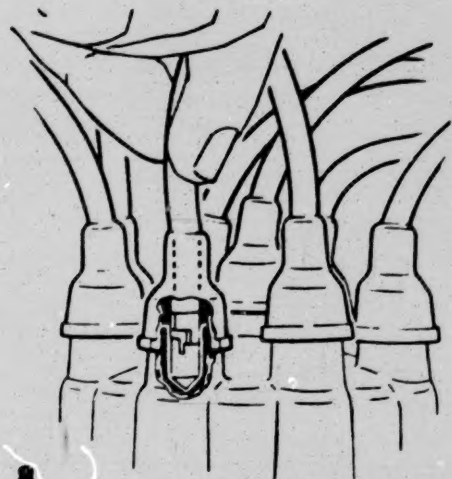
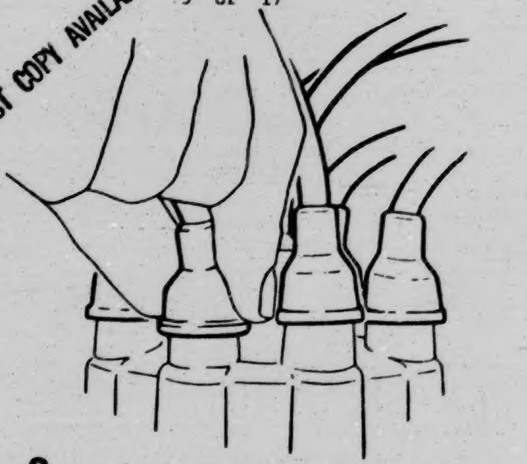


8

Press down firmly on each lead to make sure it is all the way down in the tower. All leads should be tight and snug when properly placed in their tower.

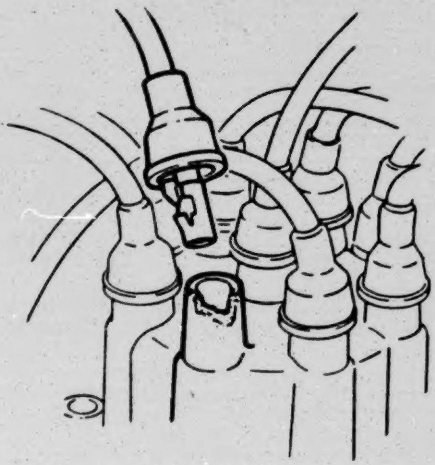


9

Check rubber boots to make sure they are down and tight around each tower. An improperly positioned boot may push lead up in tower and result in a poor electrical connection.

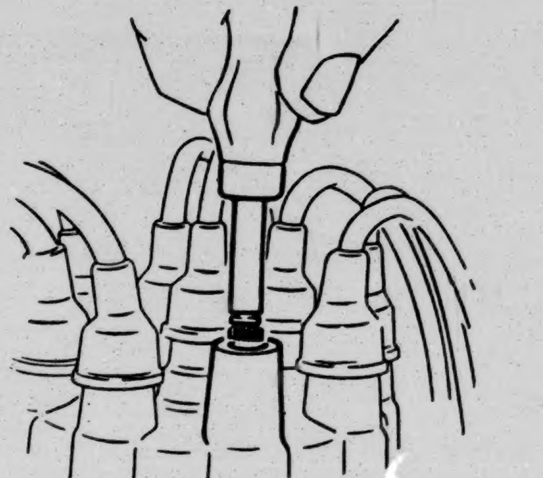
10

If any leads are loose in their towers, remove them one at a time to determine if metal clip is securely fastened to end of lead or if tower is eroded. Lead or cap replacement may be required.



11

If a tower with a loose lead appears to be in good condition except for minor corrosion, the tower insert may be cleaned with a wire brush or by some other suitable means. Removing the corrosion may uncover a major defect that may indicate the need for a cap replacement.



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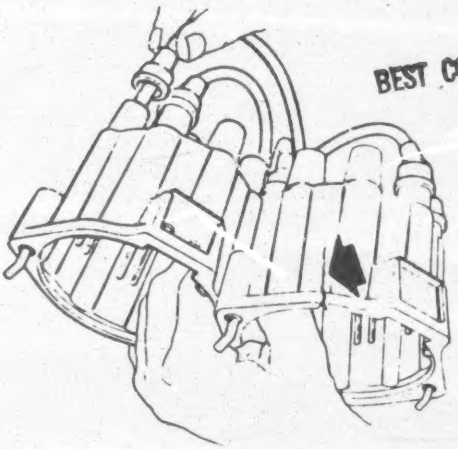
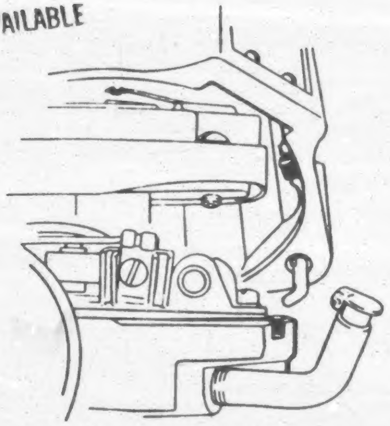




12

To replace a defective cap, place old and new caps side by side in same relative position noting locating lugs or slots. Remove one lead at a time from the old cap, placing it in the same relative tower on the new cap. Lead must first be pushed to bottom of tower and then the rubber boot replaced securely.

14

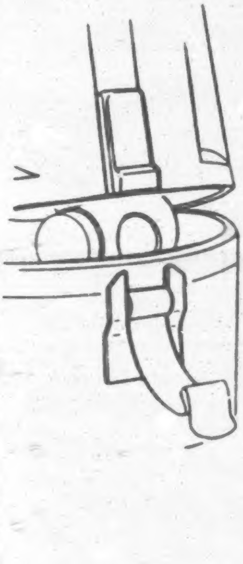
Other types of distributors have either:
a locating lug that fits into a slot in the cap spring hanger---or a groove or slot in the cap that fits over a boss on the distributor housing.

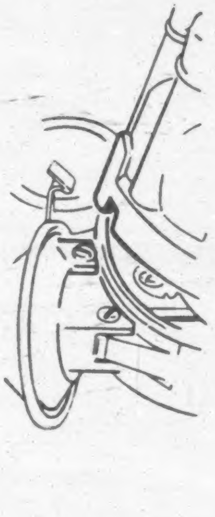
13

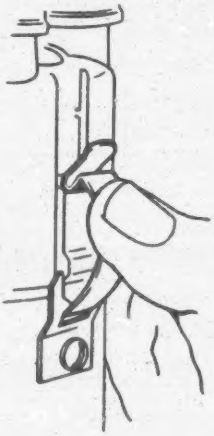
To properly locate cap on distributor bowl, some types of distributors have a locating lug on the cap that matches a corresponding slot in the distributor housing when the cap is reinstalled.

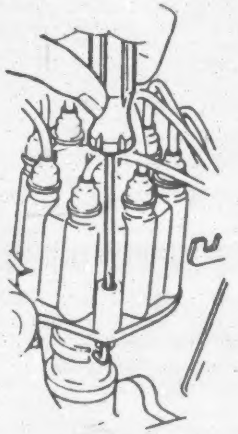
15

After replacing the cap, with the locators in place fasten it to the housing by either: pressing on center of cap spring forcing spring over mounting lugs on cap---or by pressing down on screw and turning until clamp is under slot on bottom of housing.









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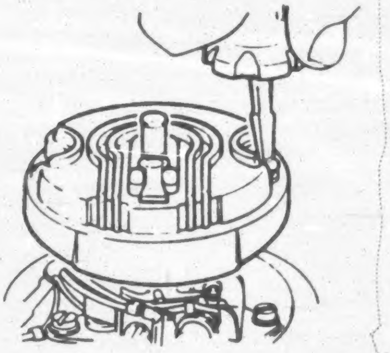
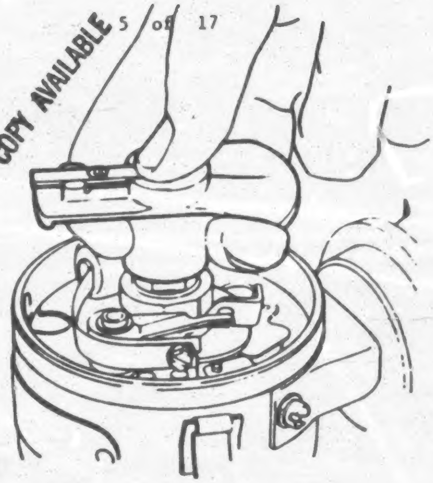
THE FOLLOWING SECTION COVERS THE REMOVAL, INSPECTION AND INSTALLATION OF DISTRIBUTOR ROTORS.



16

On the type distributor shown, the rotor is released by removing the screws.

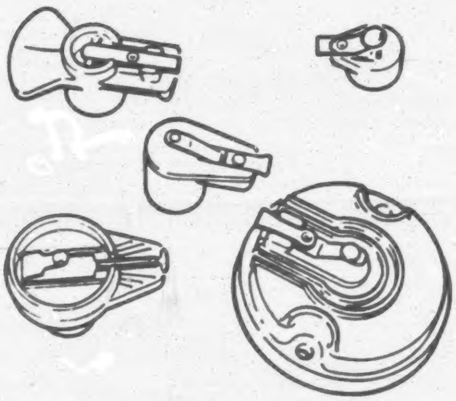


17

Removal of other types of rotors is accomplished by pulling up.

18

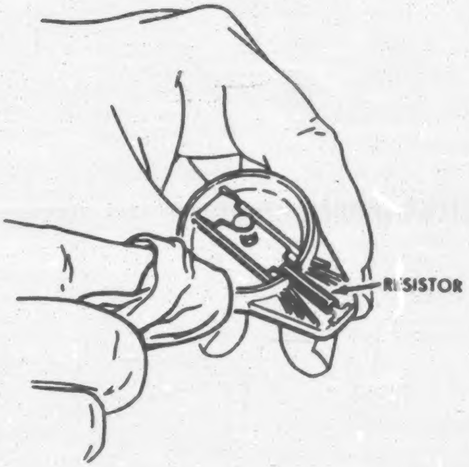
This illustration shows some of the different types of rotors that may be encountered when servicing different types of distributors.



19

To clean the rotor, wipe off dirt using a clean rag dampened in solvent. Then examine rotor for cracks or chips and inspect rotor tip for excessive burning. If rotor tip is badly corroded, scrape it clean. Check spring on rotor for sufficient tension to insure good contact with carbon button in center of distributor cap.

The carbon resistor, if present, should be examined for cracks. Rotor replacement may be indicated.



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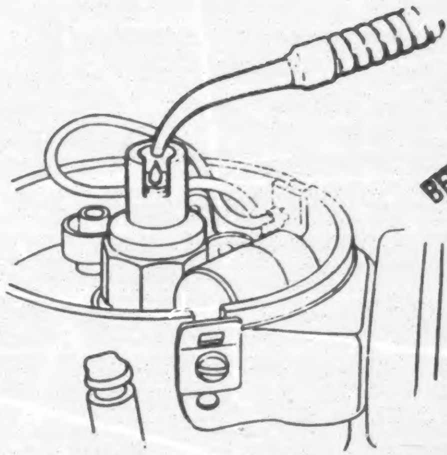
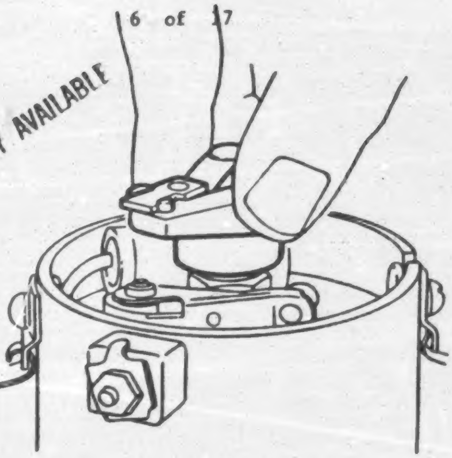
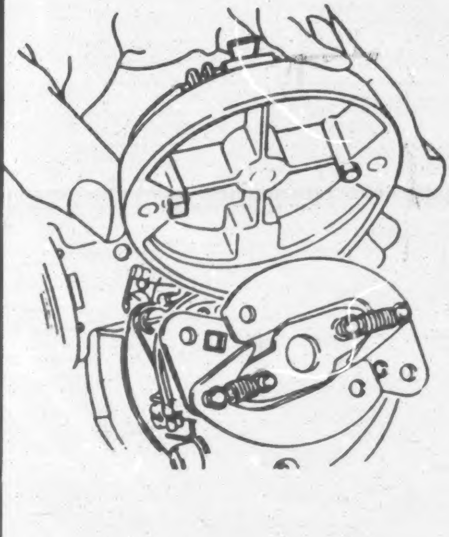


20
Place a few drops of light engine oil on the wick in the shaft under the rotor, if a wick is present. Do not over oil!

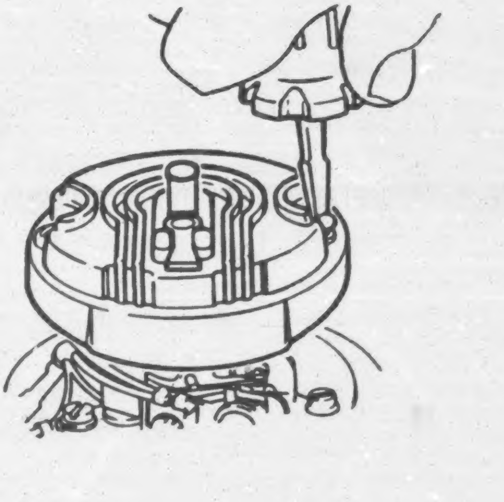


21
To install the type rotor shown push it down over the distributor shaft. Do not press on rotor spring, if present. Make sure rotor is pushed all the way down to shaft shoulder.

22
Note the locators on some types of rotors that correspond to the locating holes in the distributor weight base. When reassembling rotor of this type the locators must match holes in the weight base for proper fit and for rotor tip location.



23
When replacing this type of rotor, the screws must be tightened securely to hold the rotor in place.



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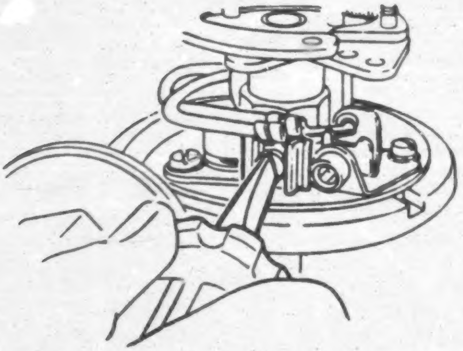
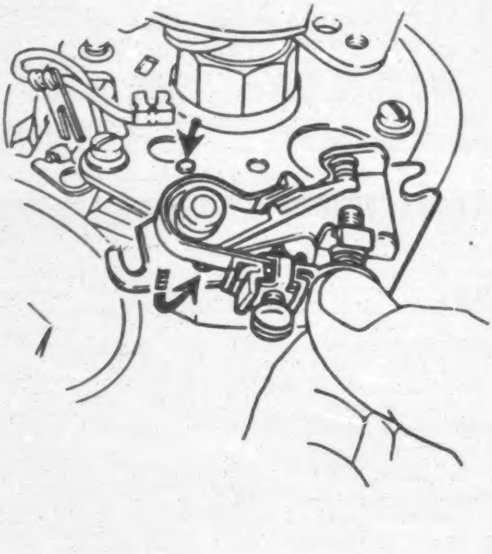
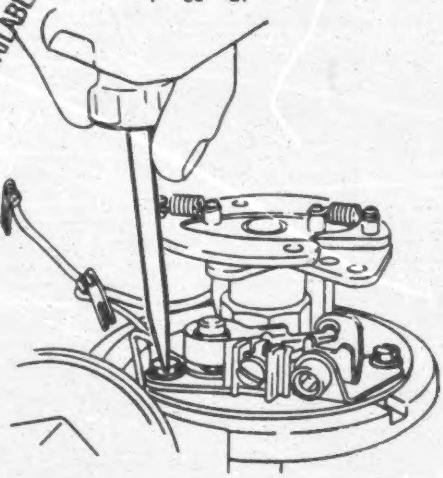
REMOVING, INSPECTING AND INSTALLING DISTRIBUTOR POINTS AND CONDENSERS.



24
To remove the contact point set on the "External Adjustment" type distributor, first note the lead arrangements in order that replacement may be properly made without interference with the cam, points or rotor. Then loosen screw and remove leads from terminal as shown.

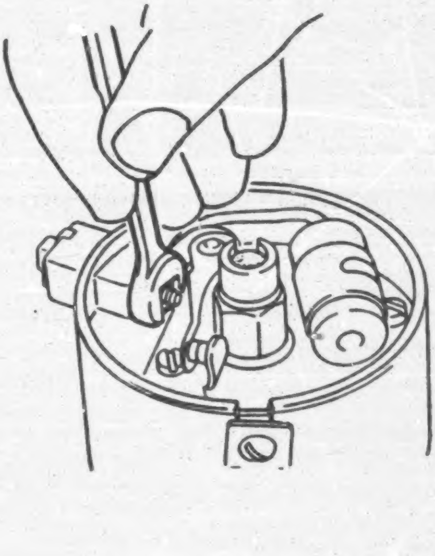
26
Then remove points. Note locating hole in base of contact point set that fits over locating protrusion on breaker plate.





25
Loosen screws that hold contact point assembly to breaker plate. It is not necessary to completely remove the screws.

27
On other types of distributors, the nut on the primary terminal must be loosened to release the contact spring and the current carrying member before removing the contact points. Here again the lead arrangement must be noted.



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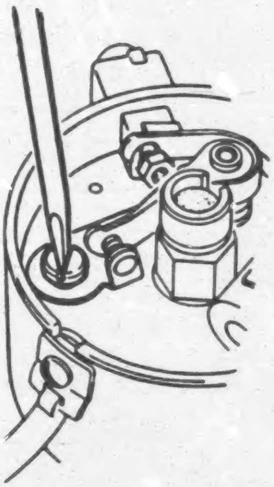
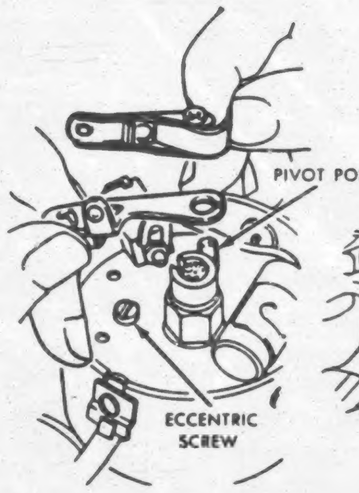
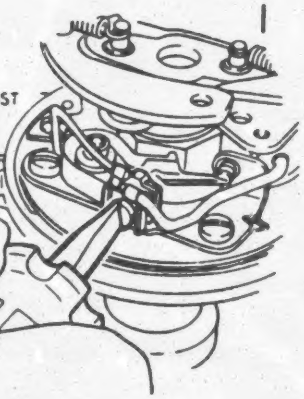


28
Then remove the one screw that holds the base of the contact point set to breaker plate.

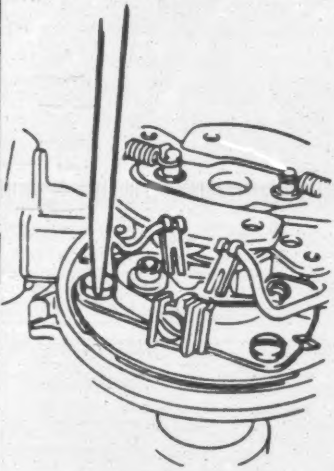


29
Lift up on the point set to remove it from the eccentric adjusting screw and pivot post.

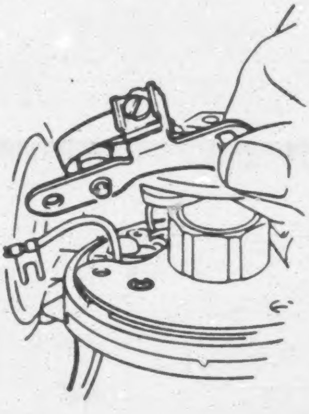


30
On the other types of distributors, the leads must be loosened from the contact point set as shown. Leads should be removed from the terminal after noting their relative positions.

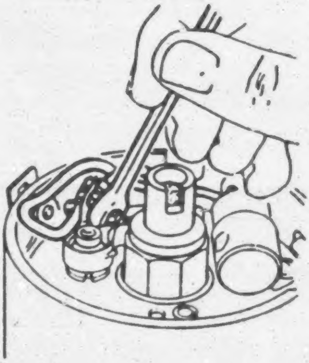
31
Then remove the two screws holding the base of point set to the breaker plate.



32
Remove point set from distributor breaker plate. Note locating extrusion on plate base that fits into locating hole of the breaker plate.



33
Still another type distributor has its leads attached as shown. These must be removed by loosening the nut at the primary terminal.



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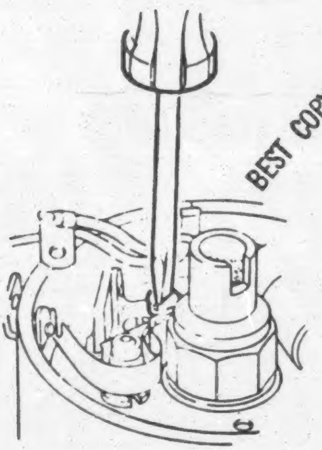
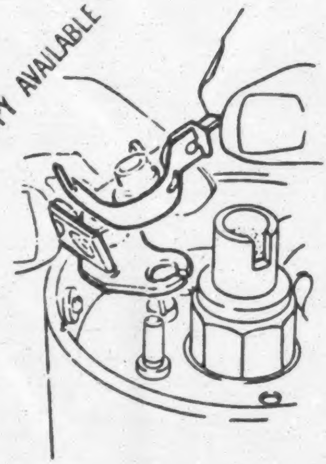
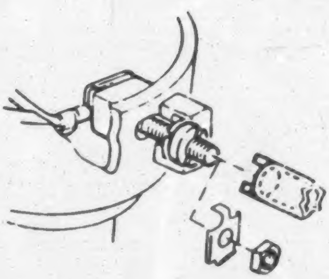






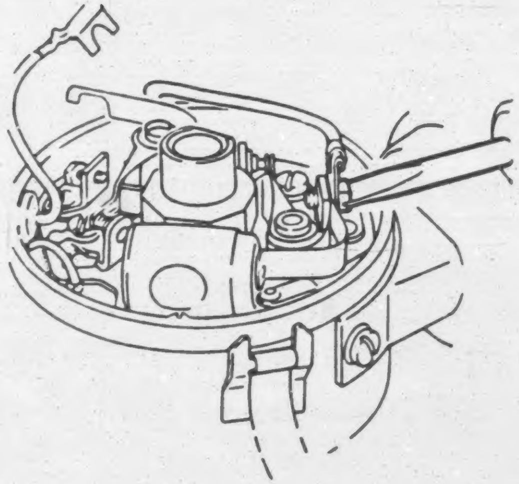
34
Remove the base hold-down screw from the breaker plate.

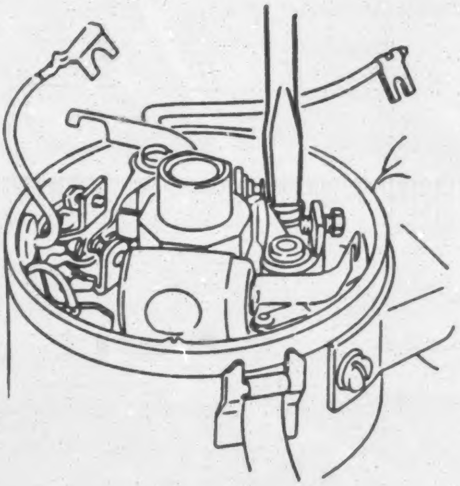
35
Then pull up to remove contact point set from eccentric adjusting screw and pivot post.

36
Another arrangement of the primary terminal is illustrated. To release the contact point spring and leads, a special tool must be used to remove the primary terminal nut.

37
On those distributors containing two sets of breaker points, note lead arrangements and loosen primary terminal leads from each set.

38
Then remove all hold-down screws from contact point set base. Lift out to remove points from distributor.





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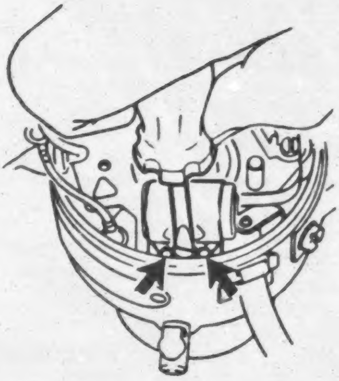
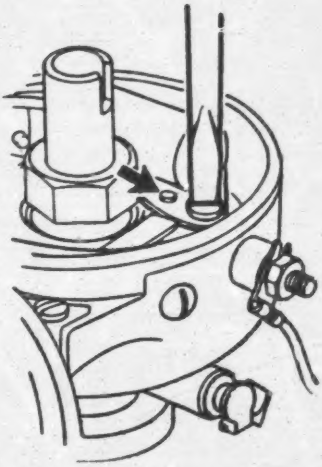
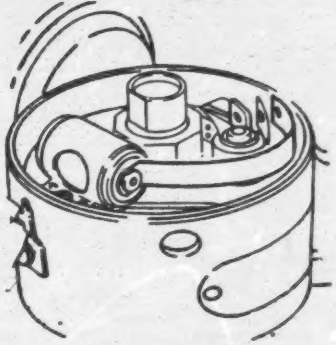




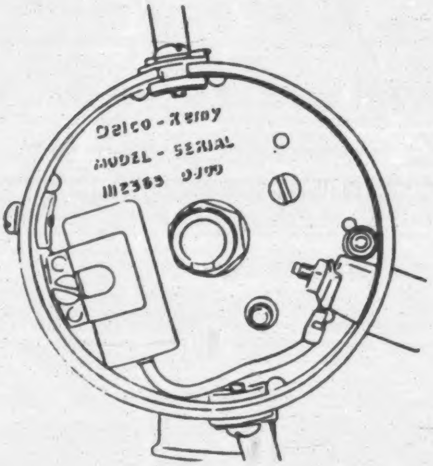


39
After leads are removed from the primary terminal, loosen screw holding condenser bracket to breaker plate to remove condenser. Note the two locating tangs in the bracket which are used for properly locating the condenser.

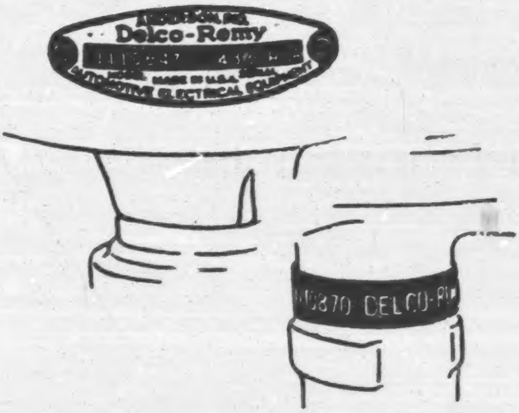
40
Other types of condensers have only one locating hole in the mounting bracket.

41
Some types of condensers are connected to the primary terminal by a copper strap which must be released before the condenser can be removed.

42
To aid in obtaining proper replacement parts refer to the distributor model number which is located on the breaker plate of some distributors.



43
On other distributors, the model number may be found either on the tag on the side of the housing or on a band fastened around the housing.



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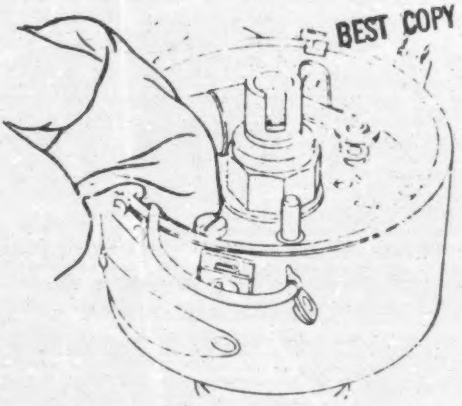
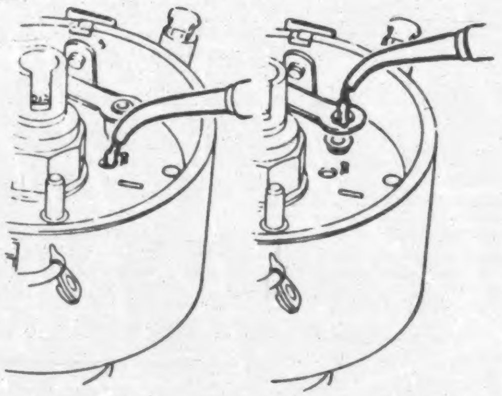
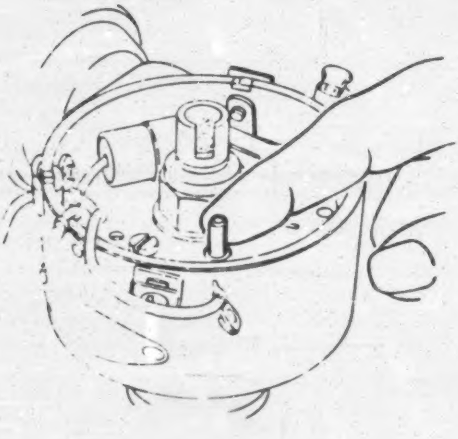


44
Before either a new point set or a new condenser is installed in the distributor, the breaker plate should be cleaned of any dirt, grease or foreign material.

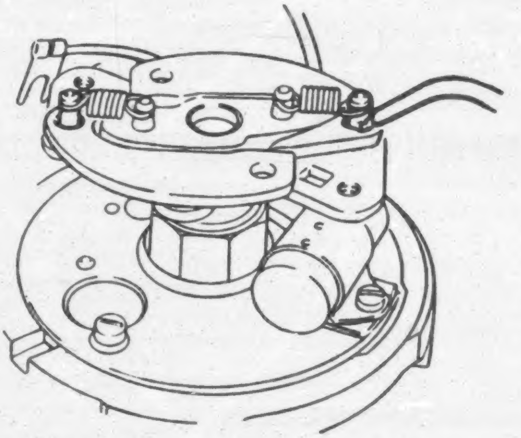


45
Breaker plates requiring lubrication and vacuum pivot arm posts should have a drop or two of light engine oil applied to insure freeness of movement. Do not over oil.

46
Also apply light engine oil around the contact point pivot post of all distributors before installing new points.



47
On distributors where the centrifugal weights are accessible, a drop of oil placed on each weight pivot post is desirable.



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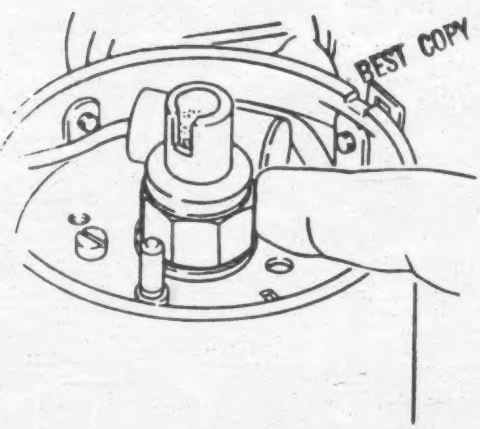
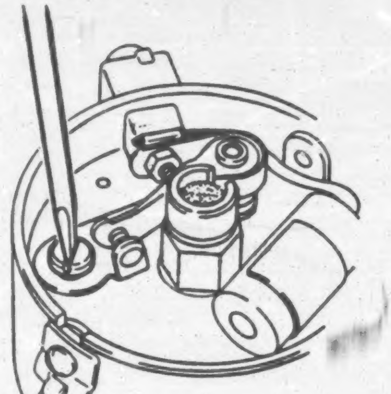


48

The breaker cam should have a light coating of high temperature grease applied to its surface prior to point installation. The amount of grease applied should be kept to a minimum to prevent the grease from being thrown off at high speeds and/or at high temperatures.

50

Then insert the attaching screw or screws, holding the contact point base to the breaker plate base. Do not tighten securely until after cam angle setting is made.

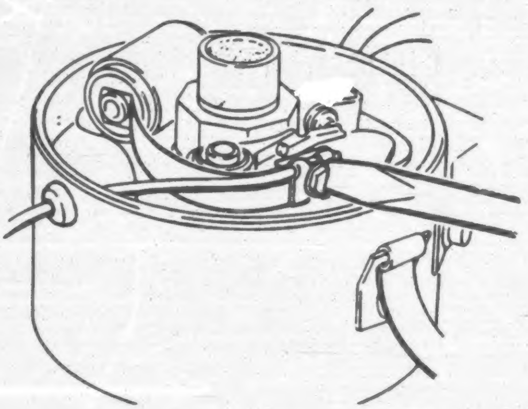


49

Assembling new contact points and condensers is the reverse of the disassembly process. In general, for point installation, first place the point set over the pivot post.

51

Carefully replace all condenser and primary leads as they were attached before disassembly so they will not be struck by the points or cam and will not restrict the movement of the breaker plate! The condenser should be located in its bracket so that it will not interfere with movement of breaker plate.



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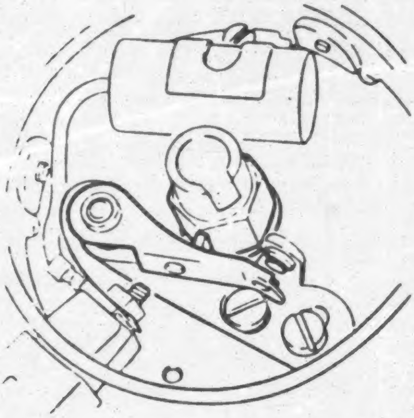
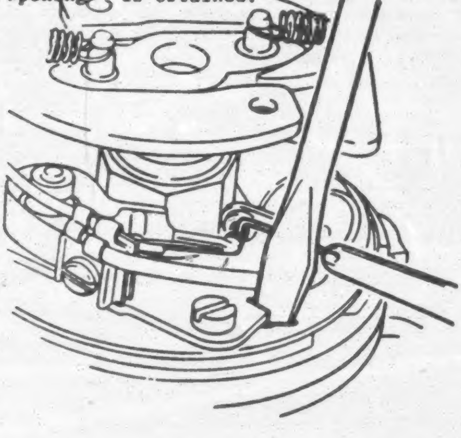


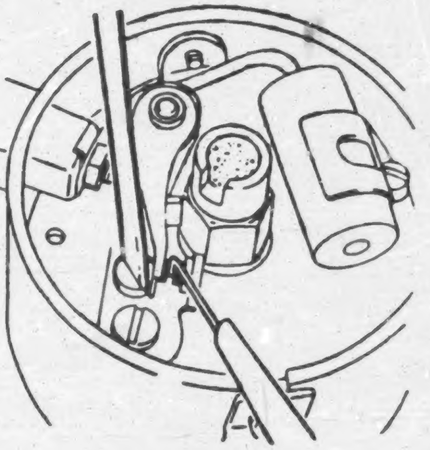
52

After installing a set of new points, it is necessary to adjust the point opening on most types of distributors. Crank the engine with the starting motor until the point rubbing block is on the peak of the cam lobe. This is the position of maximum point opening.

54

On other types of distributors, a screwdriver is used to pry the stationary point base in one direction or the other to change the point opening after the contact point base screws are loosened. The screws must be tightened securely after the correct point opening is obtained.



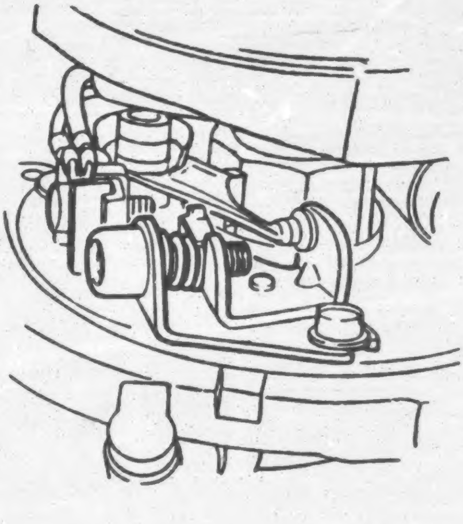


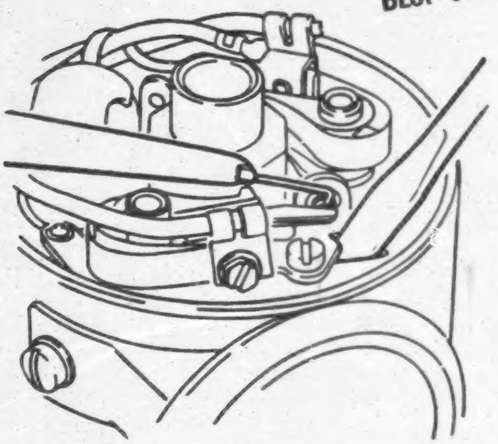
53

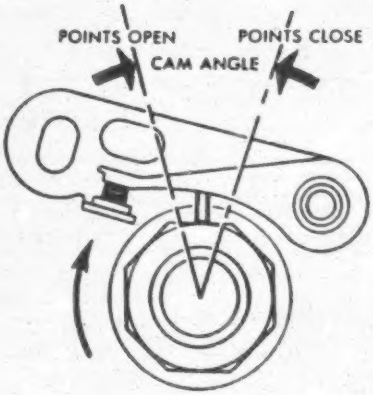
Point opening is then adjusted to the desired specifications by moving the stationary point. A feeler gauge of the correct thickness is inserted between the points to determine the correct setting. In this case, the eccentric screw is used to move the stationary point.

55

On the external adjustment type distributor, the point opening is pre-set at the time of the manufacturing. Consequently, the point opening does not need to be re-set.





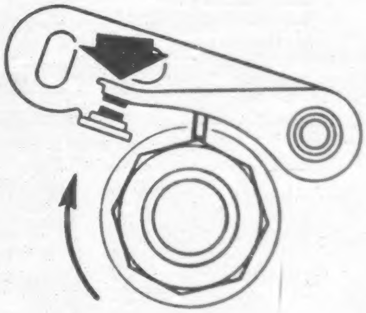


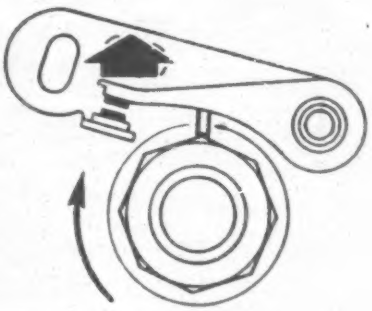
56
On distributors containing a dual set of points, the point opening of each individual set must be checked and set before the vehicle is ready for operation.

57
Cam angle or dwell is the time the points are closed, measured in degrees of cam rotation. Point opening, therefore, has a definite bearing on the cam angle. Both cam angle and point opening should be checked when new points are installed.

58
If the cam angle is too large, the stationary point should be moved in toward the cam. This will increase point opening and decrease the cam angle.

59
If the cam angle is too small, the stationary point should be moved away from the cam. This will decrease the point opening and increase the cam angle.





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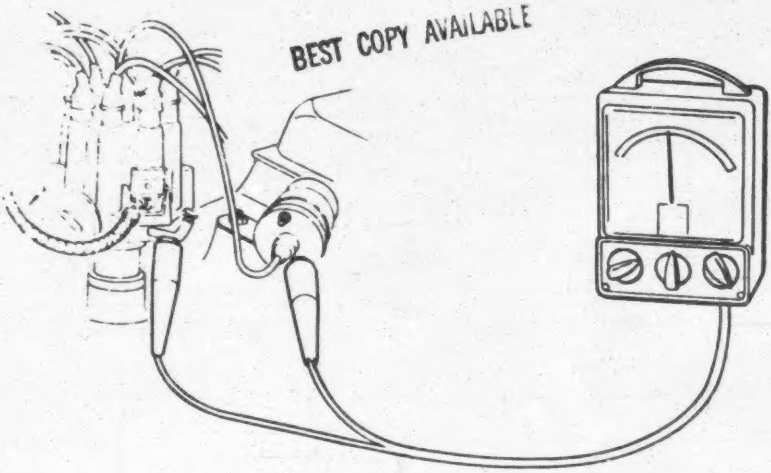


60

On the External Adjustment Distributor, the cam angle is changed by inserting a "Hex" type wrench into the adjusting screw. The screw can be turned in either direction depending upon the need to increase or decrease cam angle.

62

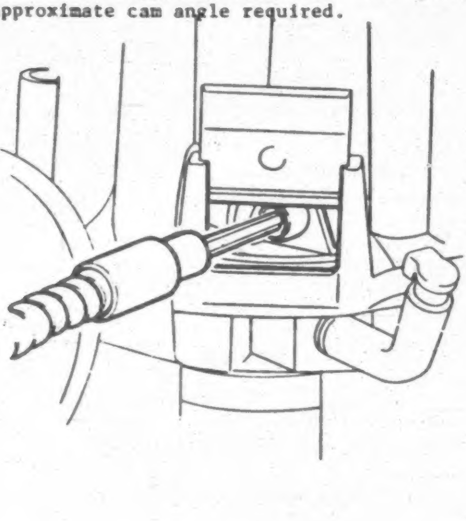
On the External Adjustment type distributor, the cam angle may be adjusted even though a cam angle meter is not available. First Turn the adjusting screw clockwise until the engine begins to misfire, then turn the screw one-half turn in the opposite direction. This gives the approximate cam angle required.

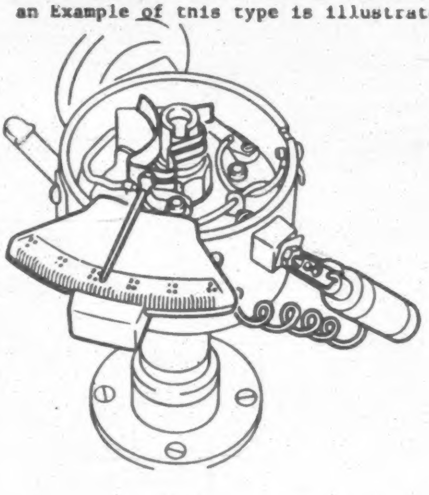
61

An illustration for connecting an electrical cam angle meter is shown. This meter measures the cam angle or dwell with the engine running. The reading indicates if specifications are being met. Compare the meter reading with the published specifications and adjust distributor if necessary.

63

Mechanical types of cam angle meters are also available. When using this type of meter the instructions of the meter manufacturer should be followed. an Example of this type is illustrated.





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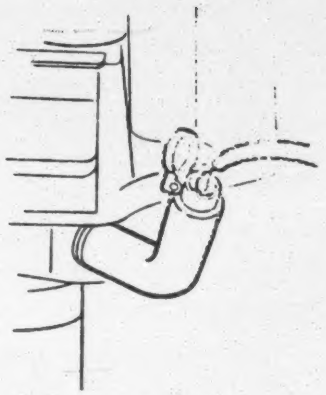
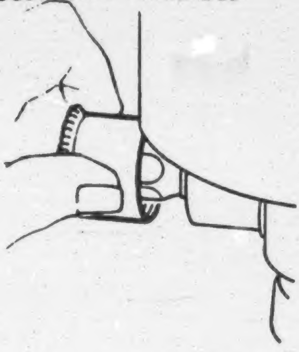
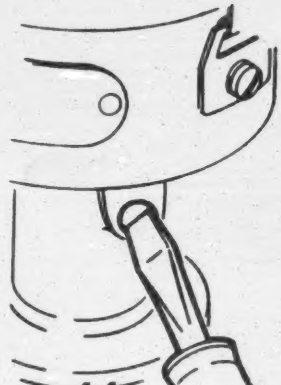


64
Most distributors should be oiled at each vehicle lubrication period. When an oil reservoir tube is present, it should be filled with a lightweight engine oil.



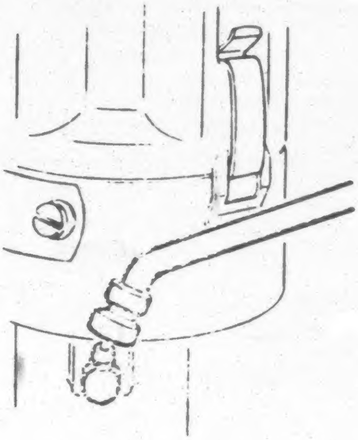
65
On distributors with a grease cup, the cup should be removed and checked to make sure it is packed with grease. No. 2½ grease should be used. After replacing it, the screw cup should be tightened one or two turns.

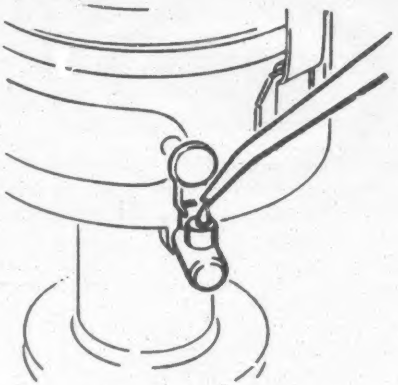


66
Distributors with oil plugs should have their reservoirs filled with light weight engine oil until the oil level reaches the bottom of the plug hole.

67
Distributors with grease fittings as shown should be filled with No 2½ grease using a low pressure gun.

68
Other type distributors with oilers should be lubricated with a lightweight engine oil. Fill to top of oiler tube.





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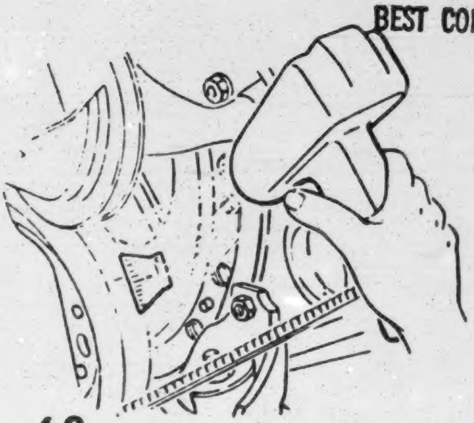
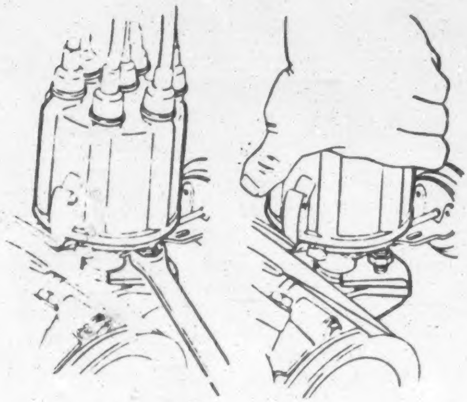
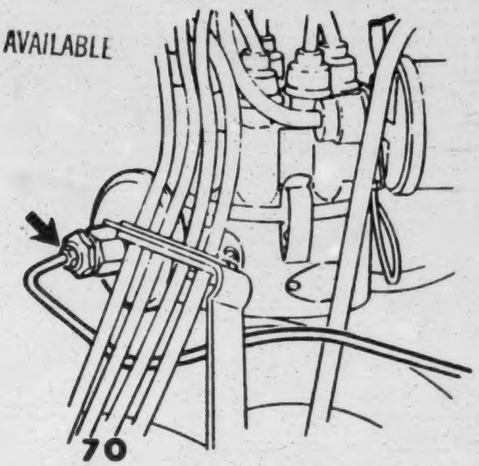


69
After new points have been installed, the timing should be checked and re-set it necessary. An example of a timing light and timing marks is shown. Follow vehicle manufacturer's specifications.

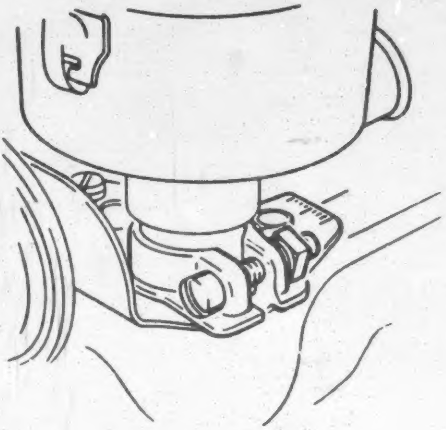
71
To change the timing, the clamp holding the distributor to the engine block must first be slightly loosened. The entire distributor is then turned in direction of rotation of the rotor to retard the timing. To advance the timing, turn distributor in direction opposite to the rotating rotor. Tighten hold-down clamp securely after adjustment is completed.





70
On some vehicles, the vacuum line must be disconnected from the distributor when the timing is being checked. Follow vehicle manufacturer specifications on this procedure.

72
On distributors with a support arm mounted to the engine block, the mounting screw must be loosened before the distributor can be rotated to change the timing. Tighten mounting screw securely after adjustment is made. The octane selector scale should be set on zero before final setting is made.



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